The Builder.

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Protection of Buildings from Lightning.

FROM the spire of Blatchington Church the violent thunder-storm which swept over the south-eastern districts of England on the 30th of December, 1879, stripped the shingles, and inflicted much injury on the sacred building. December thunder-storms are rare in Great Britain; but it is only as matter of date that the phenomenon is unusual. Violent thunderstorms are as much to be expected occasionally to recur in all parts of the country, and in some districts with great force, as are floods, high tides, eclipses, or any of the less common meteoric phenomena. Is it the case that science is unable to protect lofty buildings from such danger? Or is it the case that, in so far as careful study has enabled the physicist to arrive at the laws of electric action, the builder has thankfully availed himself of the best means of protection from damage caused by storms which study and experience combined have as yet offered for his use?

To these questions Mr. Anderson, in a work to which we have much pleasure in calling attention,* gives an answer of a very startling kind. He has filled twelve pages of a handsome royal octavo, with a table of public buildings struck by lightning; the first entry being that of the burning down of the Nicholas Tower, Hamburg, in 1589. In these earlier centuries, of course, the records now left of destructions of the kind are few. But from the year 1846 numerous cases are cited, principally from our own pages. In the year just closed eight cases are recorded, exclusive of that of Blatchington. These are:—Henlow Church, Bedfordshire, considerably damaged in April; Laughton-en-le-Morthen Church, considerably damaged in May; St. Marie's Church, Rugby, set fire to the woodwork, in June; Cleveland Market House, near Bristol, very much damaged, also in June; Wells Parish Church, Norfolk, burnt to the ground, in August; Cromer Church, and St. Bride's Church, Stepney, each slightly damaged in the same month; and the Sanctuary of Madonna del Valmala, at Valmala (which is, of course, not in England), damaged, and several persons killed, in September. In 1878, six cases of much damage are recorded, occurring in May and June. In 1877 only two catastrophes are noted; in one of which, in Poland, six persons were killed, and seventy seriously injured. In 1876 there are nine cases cited, all involving considerable damage. Nor can it be for a moment supposed that such a list, culled casually from the newspapers, can offer anything like a full record of the damage done to churches and other buildings by lightning in the years under review.

Among the cases of damage cited which most strike the eye are the following:—In May, 1789, Pforzeim Church was entirely consumed, together with thirty adjoining buildings, from being struck by lightning. In 1815, the steeples of many churches in Belgium, in places far distant from one another, were struck, and set on fire nearly at the same hour. In November, 1836, the spire of Christ Church, Doncaster, was shattered by lightning; and the church was greatly injured. The roof was smashed in, and the churchyard presented a scene of desolation and ruin. It reads almost like a mockery that the spire had been surmounted with a ball of glass to keep off lighting! Saint Saviour's, Southwark, was damaged by lighting in July, 1849, and again damaged and one pinnacle destroyed in June, 1870 (*Builder*, vol. xxviii., p. 604). Two years before, in June, 1868, the Victoria Tower of the Houses of Parliament was struck, and slightly damaged (*Builder*, xxvi., p. 416). The tall chimney-shaft of the London and South-Western Railway Company at Southampton, was destroyed by lightning in June, 1875 (*Builder*, xxxiii., p. 586); and Sir David Baird's Monument, in Perthshire, was almost entirely destroyed in May, 1878.

None of the recorded casualties to churches or lofty buildings, however, have been attended by such terrible mischief to life or limb, as well as to property, as has resulted from the striking of powder-magazines by lightning. Of this frightful kind of calamity Mr. Anderson has tabulated twenty-three instances, between the years 1732 and 1878, inclusive. At Compost Major, in Portugal, in the first-named year, the city was laid in ruins, and above 1,000 people were injured. A thousand houses were destroyed at Bremen, in September, 1739; 207,600 lb. of powder were exploded and 3,000 persons killed, at Brescia, in August, 1769; and 500 houses were destroyed, and about 1,000 persons killed, at Bombay, in August, 1857.

We have cited a few out of the recorded instances of the mischievous effects of thunder storms on buildings, in the hope that the brief but startling group of calamities will deeply impress every reader. We are not speaking of visionary dangers. The thunder-storm stalks over our land with an energy no less formidable than that which it displays in tropical climates, although the cases of violent storms may be more rare than in some countries that we might name. The metropolis is not free from the visitation. Many cases of damage may be added to those to which we have regarded as recent, and to some extent typical, namely, those of the St. Saviour's and the Victoria towers. The possibility, at any moment, and as the last week in December, 1879, has shown, at any time of the year, of a burst of thunder-storm that may shatter our proudest buildings, and kill unwary people, is indubitable. Who can read this without putting the question, What can be done, and what has been done, for the protection of our buildings from lightning?

It is not for much more than a century and a quarter than any reply could be given to these questions, except the significant word *nil*. At the present day the reply of the expert is,—Perfect protection can be given, not against the descent of the lightning, but against any serious damage from that descent. But persons are so heedless that not only are the proper precautions more frequently neglected than attempted to be taken, but that even in cases where great outlay has been incurred in the way of providing lightning-conductors for buildings, they have not unfrequently been so ignorantly designed as rather to involve than to ward off danger. And where cost has not been spared, and design has been scientific, the almost invariable neglect of testing from time to time the conductivity of the proposed safety-apparatus has left the question entirely open whether it was or was not in working order. Thus we have seen that in 1868 the Victoria Tower was "slightly damaged" by lightning. In 1855 nearly 4,000*l.* was spent, under the direction of Sir W. Snow Harris, for the protection of Westminster Palace from this kind of danger. All the salient points of what was at that time considered the best system that could be devised were introduced. And yet, Mr. Anderson tells us, "from that time to this, as far as can be ascertained, these lightning-conductors have never been tested. It is, therefore, very possible, and indeed probable, that on the occurrence of any very heavy thunder-storm, they would be found wanting, and considerable damage would ensue, the extent of which no one can estimate."

We desire emphatically to call the attention of the proper authorities to the above temperate, but yet very alarming statement. Where the responsibility lies it is not for us to point out. But in this case, which the experience of 1868 shows to be a possible one, of the destruction of a part of the noble palace, the public indignation would cause the question to be put in a very disagreeable tone. The Speaker of the House of Commons, the President of the Board of Trade or of Works, the Premier,—either of these high officials could, no doubt easily put in motion the machinery requisite for establishing a proper and a regular testing of this costly and important apparatus. And it may be excusable perhaps to suggest that if the great professional and scientific associations meeting in the metropolis,—the Royal Institute of British Architects, the Institution of Civil Engineers, or the Society of Telegraph Engineers, of which Mr. Anderson is a member,—if either of these bodies were formally to bring under the notice of the Government the fact of a danger in perfect unconsciousness of which the functions of imperial rule are now regularly conducted, that danger after a few days' investigation, would be averted.

We must refer the reader to the charming

* Lightning Conductors: their History, Nature, and Mode of Application. By Richard Anderson, F.C.S., F.G.S. Illustrated. London: Spon. 1879.

pages of Mr. Anderson for the history of lightning-conductors. Those who do not linger with pleasure over his sprightly, and yet truthful narrative, will not share our taste. It is, we think, but very little known that while it was to the practical energy of Benjamin Franklin that the first efforts to identify aërial and frictional electricity were due, the historic kite of that self-taught philosopher was preceded, though only by a couple of months, by the more costly and cumbrous expedient of an iron rod, 80 ft. long, erected at Marly-la-Ville, in 1752, by M. Dalibard, under the direction of the celebrated Buffon.

Highly instructive, as well as deeply interesting, are the accounts of the fierce and blind obstinacy with which a physical mode of guarding against lightning was resisted on its first introduction. In France, the population of St. Omer rose in riot and tore down one of Franklin's lightning-conductors, which had been erected by a manufacturer, who had been in America, and had there learned to appreciate the usefulness of the appliance, for the protection of his own buildings. The invention was declared to be "against law and religion." The manufacturer appealed to the tribunals; and his final success was due in great measure to the energy of the then unknown advocate, Robespierre.

The introduction of lightning-conductors into England did not occur until their use had become common in America. On Sunday, June 18, 1764, a few minutes before three p.m., the steeple of St. Bride's Church, Fleet-street, was struck by lightning, and so damaged that 90 ft. of it had to be taken down. Dr. (afterwards Sir) William Watson, vice-president of the Royal Society, took advantage of the occurrence to explain the action of lightning-conductors, and to urge their general adoption. The Dean and Chapter of St. Paul's, in March, 1769, applied to the Royal Society for advice as to the best means of protecting their great cathedral. The application of pointed conductors, which was finally made by the Dean and Chapter in pursuance of the recommendation of the Royal Society, was the first example of the invocation of the aid of science to protect our great churches from this form of elemental fury.

It would be doing good service to the architectural wealth of this country if any member of either House of Parliament would move for a return of the condition of our churches and other lofty buildings in respect to the provision of lightning-conductors, and the mode adopted to test their efficiency. The cost of a single catastrophe, such as that of last week, must be much more than would be that of such a return. And the official direction of the attention of deans, rectors, and other ecclesiastical authorities responsible for the fabrics of our churches, to the proper provision to be made against this special danger, would hardly fail to bear some good fruit. If anything is done towards the preparation of such an architectural Domesday Book as we recently suggested, a special chapter should be opened for recording the effects of lightning, and the steps taken to ward off this sudden danger.

That sullen and angry prejudice which always springs up when any great benefit to mankind is offered, as a new discovery, by science, has not failed to do its utmost in defence of the "vested interests" of the thunderbolt, and in the prevention of the use of the proper means for defence against its fury. Mr. Anderson has called attention to the remarkable fact that the same person, Dr. Johan Injenhousz, a native of Breda, in the Netherlands, born in 1730, who was one of the most important agents in forwarding the introduction of vaccination, was also one of the most successful advocates of the use of lightning-conductors. It may be thought that among the chief, if not the chief, benefits hitherto offered by science to the human race, have been the antidotes discovered to damage by lightning, to the sweeping slaughter of the small-pox, and to the terrible agony of surgical operations, or to that often occurring during child-birth. What, we may ask, would have been the honour and rewards which ancient Greece would have bestowed on the inventors of lightning-conductors, of vaccination, or of anæsthetics? Yet no three steps in the advance of mankind have been more fiercely resisted, and that under the plea, in too many cases, of religion,—that vicarious religion which prefers that other people should suffer rather than that one's own pet theory should be disregarded. In each of these cases, it is true, nearly as much danger may attend on the attempts to apply the remedy by unskilful hands, as on the refusal to use it altogether. It is natural that such should be the case. In dealing with mighty sources of evil, the utmost care of the expert is requisite. It is ignorance that is the true enemy of man in such cases; and it matters comparatively little whether ignorant men refuse to allow the proper application of a great remedy, or attempt to apply it to themselves, without previously getting rid of their ignorance.

In Italy the Church committed itself to an opposition to the new discovery, similar to that with which it had met the noble toil of Galileo. "The priests here," says Mr. Anderson, "as in other Roman Catholic countries, actively opposed their introduction, and to do so more effectively, they craftily attached to them a stinging name, calling them 'heretical rods'." Let the reader turn to Mr. Anderson's fourth chapter, on the spread of lightning-conductors in Europe, for the graphic tale how "very silently, in the dark of night, the priests of the Siena cathedral, directed by Abbé Toaldo, laid their iron rods along the walls of the building, but inside, planting them deep in the ground, and with the pointed summit only a few feet above the highest point of the steeple." The secret, however, oozed out; there were signs of a popular outbreak, when,—the date was the 18th of April, 1777,—a tremendous thunderstorm came on; a flash of lightning struck the cathedral, and the protection afforded by the conductor proved to be absolute. It was thereupon recorded in the archives of the city that their noble cathedral had been preserved by the use of a "heretical rod."

We do not here give an abstract of Mr. Anderson's chapter on the principles and mode of application of lightning conductors, and that for two reasons. The subject is one which demands profound study on the part of the architect, and no one who is responsible for the protection of a building will do justice either to his reputation or to his clients if he fails to read such a digest of the information now available on the subject as will be found in the volume under notice. In addition to this, there is one point as to which Mr. Anderson is very insistent, but as to which we should be glad to obtain the *consensus* of electricians as a body before we set it forth as absolutely established. We refer to the statement, quoted from a work on "Lightning Rods," by Mr. Phin, that "the insulation of lightning conductors is not only useless, but dangerous." We are not prepared to controvert that statement; but neither are we prepared, at the moment, absolutely to admit it. In the case, for example, of a building containing masses of metal not in metallic connexion with one another, we can conceive that the conduction into one such mass of the electric fluid by a non-insulated conductor might prove a source of danger, more especially in case of any interruption to the conductivity of the lower part of the rod. This is, perhaps, almost the only part of the practical portion of the book as to which some degree of reserve should be felt. As to the other main requisites insisted on by Mr. Anderson, too much attention cannot be paid to his advice. The general theory of the protection of buildings may be said to include the metallic connexion of all masses of metal entering into the fabric; the connexion of the conductor or conductors with water or with permanently wet earth (no "earth" being equal to a cast-iron water-main); and the projection of metallic points above the most salient parts of the building. Attention here is due to the fact that the heated vapour ascending from a chimney offers a readier road to the lightning than does the ordinary atmosphere. Hence the skill of the expert is necessary in the application of a conductor to a chimney.

The recommendation, however, which is of the first importance is that of the due and regular testing of conductors. We say of the first importance, because, in point of fact, it is a proceeding which, if properly carried out, involves the due provision for all the contingencies that should be avoided. Thus testing may be regarded as having a double value. First, in the hands of an expert it will show whether the arrangement actually adopted for the protection of the building is properly designed and carried out. Secondly, it will show whether any accidental damage or defect, such as the decay of part of the connexion by rust, or the want of sufficient moisture in the earth to which the conductor is led, has arisen after the completion of the apparatus.

On this point we recommend all concerned to study carefully Mr. Anderson's 16th chapter, on "Inspection of Lightning Conductors." It should be generally known that a regular inspection of these appliances,—as yet all but unheard of in England,—has been for a long time in practice in several States of Continental Europe; among them, Germany and France. And yet it must be remembered that unless this precaution be taken, the safety of our noblest buildings may at any moment be in peril; the defence on which we trust being, in reality, out of working order. In Schleswig-Holstein, a province in which thunderstorms are probably more numerous than in any other part of Central and Northern Europe, there are special laws under which damages by lightning are not made good, except to a limited extent, by fire insurance companies, unless it is proved that the edifice struck has been provided previously with efficient conductors. The fact that an insurance office under the patronage of the Government had been called upon a number of times to pay for damage caused by lightning, in cases where the buildings were provided with conductors of the best design, led to a special inquiry, the report as to which is one of not the least valuable parts of the contents of Mr. Anderson's volume. The questions raised as to the utility of conductors, says Dr. Holtz, the reporter, depend on the overlooking of two facts,—first, that the cases where buildings so protected are damaged are extremely rare; secondly,—which is the main point,—"that it is beyond dispute that wherever buildings nominally provided with conductors are damaged by lightning, their conductors are not in an efficient state. Such buildings are absolutely in the same condition as if they had no conductors at all." And such, at the present moment, may be the case with St. Paul's, Westminster Abbey, Windsor Castle, the Victoria and Clock towers at Westminster,—perhaps with every noble and lofty building in these islands. Not all of them are furnished with conductors under the direction of an expert; and of those which are, perhaps not one is assured of safety by a proper test of the condition of the conductors so fixed.

FURTHER PARTICULARS AS TO THE TAY BRIDGE.

THE daily papers during the past week have been filled, not only with such additional details as have been gleaned of the Tay Bridge disaster, but further with suggestions and speculations of all kinds. Of most of them,—ornamented, as some of them are, with the letters "C.E.," "M.A.," and so on,—the true moral is, how unadvisable is it for any but a trained public writer to rush into print *dpropos* of such a calamity. There is one correspondent, for example, of a morning paper, whose real opinion, as far as we can read between the lines of his letter, is in close accordance with our own, but whose letter contains something like nonsense, simply from lack of practice in bringing out dispassionately what the writer really means. He says that the height of the piers had nothing to do with the fall of the bridge. He means that it is within the province of the engineer to proportion the strength of the piers to their height.

It is noteworthy that, so far as we have been able to collect, with one exception, no writer on the subject has put his finger on what we hinted at last week as to the weak point of the structure. The nearest approach to our view has been made in the opposite direction. This is by the engineer of the Severn Bridge, who has had the good fortune to be able to indicate very distinctly that he has made careful provision against the action of the leverage of the piers on their juncture with the earth. Only one thing needs to be added to the careful provision displayed by this designer, and we trust that, although not mentioned, this has not been omitted. The cylinders are of 10 ft. in diameter, bolted together by fifty-six bolts for each pair of flanges, and filled with concrete. The point to which we call attention is,—Is this cement concrete? If so, the permanence of the structure may be very great, and the oxidation of the iron of the cylinders may be, with proper care, not only very slow, but perceptible to the eye. But if lime concrete form the central mass, there is too much reason to anticipate a

destructive action, such as that to which we have more than once called attention,—on both bolts and flanges. The action of lime mortar on iron is not only destructive, but irresistible.

One point of interest is a statement that the American allowance for action of wind and train on a lofty viaduct is 100 lb. per foot run, being made up of 56 lb. per foot on the former, and 35 lb. per foot on the latter. The difference between the two is explained on the ground that more than the allowed pressure would force the train to leave the rails. But that, unless in a case where the train was blown over the viaduct, would by no means diminish the resistance. It has been left out of sight that the rate of progress of the train was only three miles per hour on passing the cabin. Its speed, no doubt, was got up in the 900 yards of bridge for which its passage was watched, but twenty-five miles an hour was the utmost speed allowed to be attained on the bridge. And as guard rails were added to the permanent way, the only effect of the wind in mischievously disturbing the train as to its position on the bridge must have been in the way of tipping it over to the side,—not in that of causing it to surmount the rails. From the evidence of John Watt it is clear that the force of the wind kept the train so much to the east of the centre of the track, that the friction of the spokes or tires of the wheels against the guard-rail produced a succession of sparks, the guard-rail thus acting to some extent also as a break. In any case the surface of the train must have offered a direct resistance to the action of the wind.

The American allowance would give a lateral pressure of 65 tons to the bay of 245 ft. We consider it is quite possible that a pressure of 55 lb. or even more was exerted on the entire surface,—both of girder and of train. It is, however, more to the point to inquire what was the resistance afforded at the point of puncture of the iron and the stone to the tearing of the former from the latter. As to this, not a single word has, so far as we have seen, yet been said in the inquiry. And it is the key to the whole question.

The position of the engine and train has been discovered since we last wrote, and is such as, combined with the account given of the mode of breakage of each of the piers, to throw very full light on the mode of action of the disaster. That the bridge went with the train is now indubitable. That the first fracture took place at the fifth pier, almost at the moment that the engine went upon it, is as much shown by the mode in which the pillars on that pier are described as having fallen to east and west. On the sixth pier the ironwork was cut off as if with a knife. The cause was taken to be, that, breaking at the fifth pier, and weighted with a part, at least, of the train, the girder had an impetus of movement which at once swept away the connexion at the west front. Cleanness of fracture betokens great superiority of breaking to resisting force. There can be no doubt that the force was greater at the moment of its action on the clean-cut piece than at that of its action on the more splintered and ragged piece,—that is, supposing the strength of the piers to be the same. We come thus very close to what a witness must have seen, had there been one on the spot.

The practical lesson, then, is so far already clear, that scientific inquiry must assume this form. For how great a pressure on the upper part of the bridge, when transferred by the leverage of the piers to the top of the impost, was provision made? Had an iron plate been built in at the bottom of the concrete of the piers, and bolts of adequate strength made fast to this been carried up to the superstructure, the girders could not have been blown over. From the tenacity possessed by this part of the structure it may be possible to calculate the force of the disturbing power.

We trust that the account given by one reporter that some of the columns were filled with sand, will not prove to be true. We cannot bring ourselves to admit that such could have been any part of the design.

Professional men will look with interest to those features of construction of which we have indicated the importance. It would be every way more desirable if a clear account were given by the engineers, than for the public to be allowed to get at the facts by driblets from the investigation. Known the facts must be, and the more distinctly and impartially they are detailed the better will it be for all concerned. The drawings of the bridge are now put in as evidence, and the assistant-engineer has given a short statement confirmatory of the accounts before given of the bridge. The total length was 3,450 yards. There are eighty-five piers. No. 28 pier from the south is the last now standing, the destruction extending from that to No. 41. The bases are uninjured, as far as observed. From the south abutment the line runs down at 1 in 100 to the third pier. It is then level for three bays; then rises 1 in 353 for twenty-three bays, and 1 in 490 for one bay; it is then level for six bays to pier 36. From that point it falls at 1 in 73·66 to the north end of the bridge. The apex of the profile was thus five bays south of the last bay destroyed, the change of gradient occurring on the part of the bridge supported by less lofty girders. Nothing has yet been said further of the design of the bridge. But our readers will now be able to anticipate with much preciseness the scientific points on which the real gist of the inquiry will prove to depend.

It will be noted that the engine has been found close to the fifth pier.

WINTER EXHIBITION AT BURLINGTON HOUSE.

IT is, of course, out of the question to expect that the loan exhibitions at the Royal Academy rooms could have been kept up for long on the scale, in regard both to quantity and quality, on which they were at first started. Yet each year that we go to them the first feeling is one of surprise at the amount of works of a high degree of interest which are still forthcoming. The exhibition this year occupies only five of the galleries; but it would count as a remarkably fine exhibition if we had not the recollection of some of the still finer ones which have preceded it.

The special point of the loan exhibition this year lies in the collection, in Gallery IV., of a number of examples of Holbein,—Holbein and his school, as the catalogue puts it; but it is the Holbeins which make the interest of the room, and such a collection of the finished works of the great portrait-painter of the Tudor period comes very suitably after the fine collection of his crayon studies which we had the advantage of seeing in last year's exhibition. The more one studies Holbein in this collective form the more one is impressed with his power and conscientiousness as a portrait-painter; his determination to convey the very personality of his sitter in every detail, and his powers of carrying out this laudable aim. There is no need of any testimony beyond the internal evidence of the works themselves to prove that they are, and must be, admirable likenesses of their originals. The small portrait (150) belonging to the Duke of Devonshire, one of the first we come to, is an admirable example of that marked individuality of character and expression which is the result, in such a picture, of real insight into the character of the sitter's countenance and conscientious fidelity in reproducing it. The type of face is one not very usual among Holbein's subjects, and strikes one as very modern in style and expression; a half-length of a man with thin nervous face, the expression of the mouth given with the greatest refinement; he holds a pink in his hand, the colour of which we suspect has a good deal faded, and which was probably originally intended to give a bright spot of warm colour to a portrait otherwise somewhat cold in tone. This portrait does not suggest, in fact, so strongly as some others, what a great advantage a realistic portrait-painter in those days enjoyed in having before him costumes so picturesque and often so rich in colour and design that merely to render them faithfully was to make a fine decorative painting, without introducing anything at variance with the usual every-day habit and *entourage* of the person represented. We can still find this source of effect often in children's portraits, rarely in those of women of the day, hardly ever in those of men; even an official or military costume, when there is an excuse for its introduction, being far less satisfactory to the painter's eye than the every-day dress of persons of consequence in Holbein's time. This pictorial beauty of dress is notably illustrated in the portrait of "A German Lady" (168), with a face of exquisite delicacy, the beauty of the lips being especially remarkable, though the face is not a strictly handsome one: here the costume is rich and beautiful to a degree, and executed with the most loving fidelity and enthusiasm. The flesh tints of the face may have faded a little, the complexion is a little too cold and colourless, though this is occasionally the case with Holbein's female portraits. In strong and almost dramatic contrast to this is the one next before it, the three-quarter portrait of "William West, first Lord Delawarr" (167), lent by Mr. Holford. This is a most characteristic likeness of an obviously fast young gentleman of the day, standing in a somewhat insolent attitude and demeanour, with his legs apart and one hand on his hip; the face is most decidedly that of a dissipated fellow with a good deal of force of character about him, and it is not the least surprising to read that he was "disinherited" by the uncle who had adopted him, nor that he was afterwards created Lord Delawarr for his services at the siege of St. Quentin in 1568; after which the uncle relented and restored him to his inheritance in 1569. Nothing could be more completely in keeping with this short and significant history than the face and figure here represented by Holbein; and this portrait, so different in character from many of Holbein's, seems to indicate that the dignified, but rather stiff and stately manner which marks the majority of Holbein's portraits, was the real characteristic of the gentlemen of his day, since he departs from it so widely in painting a *mauvais sujet* of exceptional character. "The Wheel of Fortune" (169), often engraved, is an exceptional work of another description; an allegorical painting of conventional and rather absurd character, a kind of thing on which we do not like to see Holbein throwing away his powers. The portraits of Sir Henry and Lady Guildford derive their chief pictorial effect from the costumes, which are superb, and superbly painted; the faces are those of a couple of regular well-to-do John Bull people of a very uninteresting type; the fidelity with which the painter has given the fat, creased neck of the stout country gentleman is almost amusing; the flesh tones are disagreeable and unhealthy, and whether we are to charge this on the painter or on his original it is difficult to say, but the latter is the more probable conclusion. "Butts, the King's Physician," and Lady Butts, form an equally characteristic and more interesting couple. Again, we have a specimen of Holbein's decisive way of marking character in the portrait of Derick Berck, "probably a merchant of the Steelyard" (172). The completely different character of this shrewd practical face from that of Holbein's more aristocratic sitters is most unmistakable; the portrait is one of the finest and most carefully painted in the collection. The centre place, near this, is occupied by the fine full-length portrait of Christina of Denmark Duchess of Milan, the lady who declined the offer of Henry VIII. because "she had only one head"; she is here shown as a young woman, not handsome, but of noble mien and figure, and with a very fine countenance, upon which, however, the artist has not bestowed that care and minuteness of modelling which we see in so many of his portraits. The portrait of Sir John Moore (182), the father of Sir Thomas, is noticeable at once for its strong family likeness to his more celebrated son. The "*Noli me tangere*" (187), from Hampton Court, is interesting always as a specimen of a line of subject which the artist did not often undertake, but it serves to show also that he judged his own powers rightly in keeping chiefly to portrait-painting; it is stiff and devoid of feeling, in the result at least, with whatever earnestness the subject may have been intended. Among the other paintings in this room (there are a good many more Holbeins of more or less interest besides those we have mentioned) the small Lucas Cranachs, representing two Electors of Saxony, each with a copy of verses underneath the head, on a red ground, are interesting; but next to the Holbeins in real interest is certainly Antonio More's portrait of the Princess Elizabeth, which strikes us as having been repainted more or less, but this has not impaired its force and vigour materially; it is a three-quarter length of a fine young woman, with handsome and powerful, though rather coarse features, and reminds one at once of the strong-minded, courageous, but slightly flippant girl, so well brought before us in some scenes of Tennyson's "Queen Mary."

Returning to Gallery I. we find here some of the best things in the collection, among which may be first named the very beautiful early Turner, "Somer Hill" (11), a park scene, bathed in mellow light, a clear, calm, beautifully-composed picture, remarkable among other points for the fine and careful drawing of the trees in the middle distance. Opposite to this

is Callcott's large "Mouth of the Tyne" (38), and though Callcott is not Turner, there is a grandeur and breadth of style in this which we do not always find in this often too placid and tame landscape-painter; the water is certainly very brown and dull in colour, but the same may be said of not a few of Turner's sea-pictures before he was emancipated from the conventional standard of colour of the old English landscape school; and the drawing and movement of the waves in this picture of Callcott's are very fine indeed. A Turner of later date, and not quite in the artist's highest way, "The Grand Canal, Venice" (35), may, however, be instructively compared with R. P. Bonington's "View of Venice" (40), hung as a pendant to it. The Turner is in a flood of southern sunshine, and going from this to the Bonington, the sunshine seems absolutely to have *gone out*, and all is leaden, though most carefully painted in a regulation method. Such is the difference between genius and mere talent in the handling of nearly the same materials. Among the portraits, Romney's "Miss Lucy Vernon" (29) is the most interesting. The catalogue tells us the work, engraved as "The Sempstress," was generally supposed to be a portrait of Lady Hamilton, "but the name here given was found on a piece of paper pasted on the back, and also in chalk on the picture." There is something so sweet and modest in the whole manner and pose of the young girl in white dress and looped hat, that we much prefer to suppose she was really a young lady of repute and worth, rather than a very public character acting the part. The white dress is very effectively treated in a few large classic folds, slightly but sufficiently indicated. Reynolds's "Countess Waldegrave" (14), a seated half-length, the head resting on the hand, produces the reverse impression; she is a fine, handsome, but bold and imperious-looking woman; the painting of the face is exceptionally fine, even for Reynolds, and the white dress with gold powdering is very effective. Several specimens of George Morland in the room are not in his best way. "Horses entering a Stable" (18) is the best, and has fine qualities, but not the marked character of Morland at his best. We should not have omitted, by the way, Reynolds's admirable portrait of his friend Burke, belonging to the Corporation of Bristol; a painting which is at once amusing in the very decidedly Irish expression which is shown in the face, and impressive from the forcible character imparted to the firm mouth and large under-jaw and chin: the head at once stamps itself as that of a remarkable man. The late Joseph Severn's paintings, of which there are two or three, are interesting for the sake of their author, but they belong to a school that is somewhat *passé* now; we are glad to see them, nevertheless. Samuel Scott's "View on the Thames" (6), showing some of the old Thames waterside buildings, and the spire of St. Martin's-in-the-Fields in the distance is an excellent little bit of architectural painting, the more interesting as it is evidently painted with every intention of topographical accuracy. Another painting of old London is the view in Old Covent-garden by Nollekens (father of the sculptor), in which, however, Inigo Jones's church-front is disgracefully libelled and deprived of all its characteristic solidity and power. A fine Crome (23) should be mentioned, and also Hogarth's amusing picture of "Garrick in the Green-room," reciting with outstretched hand, and one leg over the arm of his chair, the other members of the company (portraits) ranged on the left of the room.

Gallery II. contains a considerable proportion of Cuyps, Hobbemas, and Ruysdaels, and "that set," of whom a moderate dose at a time is sufficient; but also a noble Vandyck, the "Earl of Arundel and his Grandson" (57); the slight little figure of the child contrasting beautifully with that of his majestic-looking grandfather, clad in complete armour. Cornelius Janssens's portrait of a very *spirituel* long-haired youth, said to be Lord Falkland, is an unusual and very good work; and there is a fine Terburg, "The Glass of Lemonade" (77), fine in spite of the repulsive appearance of the gawky young man with long unkempt hair, who seems to be the gallant in the case. Van der Neer is a sweet idyllic artist in his way, yet we absolutely deny that his "Moonlight" (78) is moonlight, or that any one ever saw so much detail in a landscape by the light of any moon in Northern Europe. But, in fact, genuine effects of moonlight in painting, ancient or modern, are among the very rarest things; painters are always tempted to put in too much, and to forget how very little light there is in even the brightest moonlight, for purposes of definition and colour, as compared with daylight.

Gallery III. contains two or three noble Reynoldses, foremost among which is "Lady Elizabeth Compton" (135), a full-length portrait of a beautiful and dignified woman facing the spectator, in long easy-flowing robes, and resting one arm on the back of a bench; the painter has arranged the foliage of the trees that droop over her so as to leave a semicircle of sky round her head, giving the effect of a kind of "glory": the device is not too palpable, but evidently intentional, and heightens the effect of the work, which is painted as if the artist thoroughly admired his subject, and was bent on making the most of her. The portrait of "Mrs. Riddell" (131), a plain-featured but thoroughly dignified lady, walking leisurely across the scene, is another good example of the great portrait-painter; but a better one than this is the three-quarter length of "Miss Sarah Campbell" (142), a fine robust-looking girl in the full glow of health, with a great pile of head-dress and a kind of balloon skirt, which spreads at each side of the figure and intensifies the general appearance of vigour and *embonpoint* which characterise the whole; the face is beautifully painted. There is something almost pathetic in looking at such a picture of blooming, joyous life and health, the image of what has long since faded, grown old, and vanished from the scene. Next to this is a fine Gainsborough, "Mrs. Lowndes Stone" (141), very different in subject and style, a face and figure full of grace and character: she is accompanied by a setter, painted with the admirable fidelity and truth which so specially characterise Gainsborough's dogs. The lady is attired in what the editors of the catalogue are pleased to call a "pink" dress; the light falls on the material so as to mask and tone the real colour a good deal, after Gainsborough's manner; we should have called it an amber dress; pink it certainly is not; but this is not the first time we have noticed odd notions about colour in the notes to the catalogue at these loan exhibitions. Another Gainsborough to be noted is "Bernard Edward Howard, afterwards twelfth Earl of Norfolk" (132), a remarkable portrait of a very remarkable-looking young man, who should have had the fire of genius in him, if his portrait is any indication of his character. Gainsborough's portrait of his two daughters, full-length, is not quite in his happiest way, with the exception of the poodle which accompanies the ladies, and which seems to be painted more *con amore* than the figures. Among the works of an older school is Titian's small-size study for the ever-to-be-deplored "Peter Martyr" (122), differing in some details from the picture. The remarkable figure of the flying attendant appears here, however, almost precisely as it was afterwards painted. There is another Titian, a "Mater Dolorosa" (97), hardly, however, of the highest interest. Tintoretto's remarkable portrait of Paolo Paruta (110), an Italian historian, lent by Sir F. Leighton, is a truly fine work, of rare individuality and power. Pordenone's "Susannah and the Elders" (108) is also an exceptionally fine specimen of its author's work,—rich in colour, fine in the drawing of the woman's figure, and very fine in composition. How much do painters owe to that indiscreet and nefarious pair of old gentlemen who thus furnished them for all time with so interesting a subject! Pordenone is in this picture superior, as a painter of female beauty, to Guido, in "Il Diamante" (101), a life-size Venus, seated on the edge of a couch, and facing the spectator. Parts of this are very finely painted, but the Venus is a heavy and unattractive figure in comparison with the Susannah before named, and moreover, the foreshortening of the legs above the knee is not quite successful, and the attitude consequently a little puzzling at first sight. Paolo Veronese's very robust "Magdalen" (99) is an essentially vulgar picture in conception, and not particularly attractive in any way. Parmegiano's "Portrait of a Count San Vitale" (100) is marked by the artist's usual stately but rather affected manner. As a pendant to this hangs the so-called Sebastian del Piombo's portrait of "Michelangelo," representing the great man seated, and pointing to a chalk-drawing of his own; a pleasing work in one sense, but no one will believe that Michelangelo ever looked so placid and "genteel" as this.

Gallery V. contains some curiosities of painting, among which we should class the series of four works by Botticelli illustrating the story of Nastagio in the "Decameron," and the vision of the fate which might attend hard-hearted ladies. Botticelli is the idol of a certain set of critics and connoisseurs at present, and we presume they will find beauties in this series of grotesque imaginings; as a matter of fact, we believe all unprejudiced spectators would find them somewhat absurd and revolting, from an art point of view, though, of course, of great interest in another sense. In the feast scene (254) the fine drawing of the architecture should be noticed. Mr. G. Richmond contributes very fine specimens of decorative painting of the Sienese school (215); and there is a fine Mantegna (220), a "Virgin and Child," splendid in colour, and with all the painter's characteristically powerful manner, which suggests building up a picture rather than painting one. The "Virgin and Child" ascribed to Leonardo da Vinci (225) is a repetition or a copy of a work by him which has already been seen at these exhibitions; we considerably doubt its originality. Two little archaic pictures, lent by Mr. Street, of which nothing seems to be known (228, 234), are of considerable interest; they both represent scenes in the life of St. John the Baptist, in which architecture is largely introduced as an accessory; and another, also unknown, lent by the same gentleman (231), is of superior interest to these. It represents the interior of the Temple and the angel appearing to Zachariah, the Temple being represented by a rude longitudinal section of a Mediæval church: the catalogue describes the groups of figures as "in adoration," but this is not exactly the case; they are expressing wonder and discussing the apparition with a naturalness of action and expression (as far as the painter could render it) which make the chief interest of the picture. The portrait of a youth (233) ascribed to Raffaelle, we do not for a moment believe to be by Raffaelle; if it is, it is not worthy of him; it is a hard, commonplace affair. Holbein's equestrian statue of Edward IV. on horseback is interesting from the rarity of such a portrait with Holbein; it is not one of his best works in other respects; the horse suggests a reminiscence of Albert Dürer's horses. There is a fine figure of St. Sebastian, labelled "Florentine School"; and a large picture, by Martinez (250), of the wife of Philip IV. of Spain, looking like a kind of unfinished copy of a Velasquez: the distant figures in the background are so effectively grouped, and the colouring is so good, that it is a pity the face of the principal figure is so entirely unfinished; the picture is painted in a broad, free style, with very little pigment on a very rough canvas, the grain of which shows everywhere. This is lent by Mr. J. C. Robinson, who also contributes some very curious specimens of early Spanish art (early Castilian school) belonging originally to a series of twenty-nine paintings which composed the principal altar-piece in the Cathedral of Ciudad Rodrigo; the most important of those here is a "Last Judgment" (245), about as hideous a thing as it is possible to conceive, but interesting as an illustration of the history of the art, which is one of the objects, we may presume, of an exhibition of this kind.

THE GROSVENOR GALLERY.

SURELY the lamentations which we often hear over the shortcomings and deficiencies of modern art must be a little exaggerated, when we can find such a show as is made in the East Gallery of the Grosvenor by the sketches and studies of contemporary artists of this island alone. That we find among these such subtle and unearthly beauty as we meet with among the studies of Leonardo, such power and force as among those of Michelangelo, we do not say, nor would the authors of these studies thank us for saying so, probably. But comparing these studies by living artists with the studies by old masters exhibited in the same rooms this time last year, we do say that the gap between ancients and moderns seems nothing like so great as pessimist critics would have us believe it must necessarily be.

We have already expressed in a few words our general satisfaction at the collection, its interest and its usefulness. But it calls for a few remarks more in detail; in making which we will commence at the East Gallery, which will be the chief attraction for most of the more artistically-cultivated visitors.

We have here, as we have already said, a considerable collection of the foundation-work of a number of the best pictures of our leading contemporary painters, and the public are able to see from these, what many of us already know, that the workmanship of paintings of a high class is at all events as conscientiously carried out now as it ever has been in what is justly called the great age of painting. When we see these numerous studies for the minutiæ of a painting; studies of hands, studies of drapery, of sleeves, of knee-joints, of osseous and muscular structure, we feel that if our painters do not produce works worthy to rival those of the Italian Renaissance, it is in some cases, at all events, not from lack of conscientious study and industry. And this carefulness and conscientiousness go even further than the details of the human figure. We noticed last year with admiration the beautiful studies by Leonardo of bits of trees and other vegetation, which looked as if the author had given himself especially to that class of subject as his main end. But we may apply the same remark almost equally to some of the studies here. Those who look at Sir F. Leighton's "Lemon Tree" (408, exhibited a year or two back in the Dudley Gallery), and at Mr. Burne Jones's "Lilies" (379), might very naturally conclude from these that the two artists were flower-painters; those who look at Sir F. Leighton's "Pozzo Corner, Venice," and "Steps of the Bargello, Florence" (394, 415), might naturally conclude that their author was an architect; and Mr. Poynter's studies of old armour for his "St. George," in the Houses of Parliament, might give ground for the supposition that their author's special object was to excel in painting Mediæval properties. It is, as we have already said, good that the general public, which know the finished works of these artists, and admire them, should also know how much of preliminary labour goes to producing such works, and how far picture-making is from being mere play of ready talent.

Studies, however, are capable of being looked upon as more than a mere means to an end; they are not merely relative, but furnish an absolute enjoyment to the spectator as well as to the artist who produces them. We might divide the studies, in fact, into two groups, those which impress us by their absolute beauty, and those which interest us as the groundwork of the artist's finished pictures, and as letting us behind the scenes and into his method of working. Perhaps, however, it were to consider too curiously, to consider so; at all events, we will content ourselves by hinting that such distinction may be made, without attempting systematically to make it. It is enough to feel that we have before us a most interesting variety both in regard to style and mode of execution. In regard to the latter, we may note that one artist, Mr. W. B. Richmond, has used very largely the old beautiful medium of silver-point, so delicate in its tone and giving opportunity for such delicate expression of outline, which be it remembered, is in this medium incapable of correction or erasure, and therefore bears the more unimpeachable evidence of the actual powers of the draughtsman. Some of this artist's small studies in this medium have much beauty and delicacy. As an absolute contrast may be taken the numerous heads by Mr. Legros, sketched before the pupils of the Slade School as lessons. Some of these partake of the roughness of manner inseparable at times from the conditions under which they were executed; others are very powerful and bold sketches, in which no difficulty of position and foreshortening is shirked. As another specimen of Mr. Legros's power over his materials may be mentioned the pen study of an old man's head (521) on one of the screens, a good instance of this artist's unusual power of modelling lights and shadows with the pen-stroke. The collection includes two or three coloured studies of heads by Mr. Holman Hunt, absolutely realistic, of course, of which that of a Syrian woman (328) is most to our mind; there is another on one of the screens (540) of a girl laughing which curiously and unpleasantly illustrates the artist's apparant incapability of seizing and conveying momentary expressions; it is as if a laugh had been mechanically fixed on the features, and then as mechanically copied with the greatest accuracy; the result is absolutely repulsive.

Lady Lindsay's pretty portrait heads in pencil (329-335) should not be passed over. Without making any great pretensions, they are very carefully finished, and we can vouch for some of them being good likenesses. Near these Mr. Linton's various studies of drapery for a picture of "Coriolanus" (338) are admirable, more especially that on brown paper which forms the centre of the series. Next in order we come to a long series of Mr. Burne Jones's studies, of which it is difficult to speak. They contain exquisite things, such as the "Study of Lilies," before mentioned (379), the three studies of drapery (377), and the illustrations for an illuminated Virgil, in the shape of initial letters. These, which are small and very delicate pencil drawings, are perfect in their way; they bring out precisely the best part of the artist's powers, and being a class of subject which is necessarily treated in a somewhat conventional and decorative manner, his somewhat conventional and mannered style does not strike the spectator disagreeably. But when we look at some of the others, such as the "Discordia" (345), where nude figures are represented on a larger scale, and with no conventional intention, it is obvious that there is much wanting in the drawing of the figure here. The legs and feet of some of these figures are quite unmentionable, and such as it seems astonishing that any artist should send to an exhibition of this type. What is the date of this particular study we know not.

Mr. G. F. Watts's life studies here are mostly pure "business," — outline drawings, rough enough, on rough paper, evidently done purely as helps towards a final result, but not in any way as an end in themselves: we do not say they are the less interesting on that account. The first study for "Britomart" is also to be seen, as well as some fine bits of red chalk and pencil studies of groups and heads. Among Sir F. Leighton's sketches, besides those already mentioned, the studies of drapery for some of the "Daphnephoria" singers are particularly interesting, and also some heads labelled "Egyptian Studies" and the study for a head in the picture of Cimabüé (410),—a regular "craftsman's" head. Mr. Poynter's sketches are genuine hard work, with little attempt at much finish in the superficial sense; and we may be allowed to say that some of the studies for figures in the "Nausicaa," and for the figure of Perseus in the "Andromeda," impress us more pleasingly in this study-phase than they did in the finished works. Among the rest of the works on the wall of the East Gallery may be mentioned two beautifully delicate little pencil studies of the figure (half-length and quarter-length) by Sir Coutts Lindsay, and Mr. Albert Moore's "Study of Drapery for a Figure in Action" (456); the latter artist's sketches of flowers and other vegetation show us that he is as careful in regard to the accessories which make such pleasant additions to his beautiful figure-subjects, as over the figures themselves.

On the screens in the same room are some of the most interesting contributions, among which may be named Mr. Poynter's studies for some of the figures in the grill-room decorations at South Kensington, and his fine study of drapery for the figure of "Fortitude" in the "St. George" mosaic, in which the grand style of the drapery seems quite to suggest the nature of the figure. This may be profitably compared with another "Fortitude" figure (503), on the other side of the screen, for an example of the distinction between a powerful and masculine design and a weak and sentimental one. Various studies by Mr. Watts and Sir F. Leighton, all of more or less interest, follow; and a considerable number more, by Mr. Burne Jones, commencing with the "Fortitude" above named; but in contrast to this it must be said that his study of drapery for a figure of "Richesse" is very fine, and has the same merit as Mr. Poynter's "Fortitude" drapery, of expressing in a certain degree the meaning and feeling of the subject represented. The studies of armour for the Perseus will be regarded with interest. One of the best things on this side of the screen, however, is the portrait of M. C. Sainton, the eminent violinist, by Mr. Legros. Mr. G. Howard sends a frame containing three very characteristic portraits of Mr. Gladstone, Lady Lindsay, and Mr. Carlyle. In the vestibule there are to be found, among some rather odd things, some also that are of high excellence: Mr. Boughton's nude study (277) is among these, and one of the best studies from the life in the gallery; and there is the large drawing of Sir Coutts Lindsay's decoration design for the dome of Dorchester House staircase, which has a generally good effect: but we do not entirely make out from the drawing how the design is applied to the dome surface. If this represents the semi-dome, as it would be seen in a sectional view, then the design must necessarily have a very different effect in execution from that which it has in its projection on the flat in this drawing.

The larger West Gallery contains a miscellaneous collection of works, of which a large proportion are landscapes, many of them of high excellence, and by artists not all familiar to English picture-seers. There are, besides, figure-pictures or studies by Israels, Tadema, and others of lesser fame; and some which will hardly add to or make the reputation of their authors. Among the good things in this part of the collection may be mentioned "The Peacock," by M. Maris; "At Anchor" (H. W. Mesdag); two or three small landscapes by Albert Neuhys; a very fine and pathetic study of a head by Israels, "A Workman"; Mr. J. Knight's large and powerful, though slightly theatrical, landscape, "Y-Garn"; Mr. Walter Crane's "Triumph of Spring," a very charming decorative picture both in design and colour; Mr. Fulleylove's "The Fountain"; and a good many others might be named, which are all worth looking at. The Water-Colour Gallery contains, among other things, two very good portraits, one by Mr. Clifford, in his well-known style; the other, a small sitting figure, by Mr. Percy Macquoid (171), seated in a chair with a peacock-back,—an admirable little picture in composition and colour.

REPRESENTATIONS AS TO HOUSES.

For some years past no branch of the law has received more public attention than that which is connected with representations by which persons have suffered damage or some kind of injury. In nearly every case, so far as we can recollect, this question of representations has arisen in regard to the formation of companies. Nor was this at all extraordinary. During the flourishing times which came to an end some four or five years ago, men acted with less caution than they should have done, and, consequently, persons not very scrupulous succeeded in floating all sorts of rotten companies, and when the bad times came the victims naturally desired to get out of the mire,—at least, so far as they could. But a case, that of Cutler *v.* Mantell, has been quite recently adjudicated upon by Mr. Justice Fry, of a different character to most previous representations, which has not a little interest for the readers of this journal, and it is so important as a warning that it can scarcely be permitted to pass into the great array of decided judgments without some few lines of comment.

It was an action to set aside an agreement for the lease of a house at Hanwell, on the ground of misrepresentation in the matter of drainage and water-supply, and for damages in consequence of certain losses which were alleged to be the consequences of the representation which was complained of. And it is necessary to give the exact words of these representations, one of which was contained in a letter of the principal, and, in fact, the sole defendant; and the other in a communication from his agent. The portion of the letter from the agent ran thus:—"When I met Captain Cutler to-day in the City, I was in error when I stated that the drainage was into cesspools. It seems that the drainage from the house enters the main drainage in the road, and is, I believe, partly or entirely discharged into the river Brent. Mr. Mantell states that no drains go under the house." The subsequent letter was, as we have said, one from Mr. Mantell, the defendant, and the noticeable part of it ran thus:—"There are no cesspools on the premises. The closets are supplied from a separate cistern to that for domestic purposes." Directly after this Captain Cutler and his family took possession of the house, two of his family died from diphtheria, and consequently he left the house, and consequently, also, he was put to no little expense. The result of the action was that Mr. Justice Fry gave judgment for Captain Cutler. To have done this it was necessary that several elements should have existed, and unless these are understood, the decision loses not a little of its value. In the first place,—and we now put these legal principles in a comparatively naked form, as the reader can apply them himself to the facts,—at the outset there must have been such a representation as influenced the mind of the person who may, for shortness, be termed the representee. For if a representation is made and not acted on by the person to whom it is made, it obviously gives no legal right against the

representor. If, for example, in this very case it could have been shown that Captain Cutler had said "cesspools or no cesspools, I like the situation of this house so much that I shall take it," it must be clear that the representation had not influenced his mind, and consequently the very foundation of the right of action would not have existed. Next, the representation must have been false. And here we must stop to point out an important characteristic of this falseness of a representation. For the maker of it need not have any fraudulent interest in making it, he need not necessarily be aware of the untruth of his statement, just as in this very case Mr. Justice Fry distinctly stated that Mr. Mantell did not know that what he said was not true. But if he made it with such gross carelessness,—if he was in a position to make himself acquainted with the facts and did not do so,—then this gross negligence equals, and has the same effect as fraud, and raises a right against the representor. And this point is one which we wish to urge with some insistence, because it is a principle which architects and builders should never lose sight of, since if they do they may find that they have put themselves in very unpleasant positions. A man may be as honest and upright as you please; he may make a representation, thinking, in his own mind, that it is quite correct; but if it proves to be false, and injurious consequences result from it to the person to whom it was made, nothing can save him from suffering,—in his pocket, at any rate,—for this misrepresentation if it had been in his power to discover the true state of facts in regard to which he uttered the statement which forms the representation. In the very case upon which we are now commenting it turned out that the drainage of the premises was in a transition state, there was still in use a cesspool which, though not under the house, was connected with the new drainage, and one of the cisterns, besides supplying one closet, afforded all the water which was used for domestic purposes. These facts, it is clear, are quite different to what were stated in the letters, although, as we have already said, Mr. Mantell clearly believed that he was giving an accurate account af the state of the drainage of Golden Manor Court. But once these circumstances are made clear, then the full force of the principle which governs this class of cases comes into play, a principle never more clearly and succinctly laid down than by Lord Cairns in a judgment delivered in the House of Lords some years ago. "If persons," he says, "take upon themselves to make assertions as to which they are ignorant, whether they are true or untrue, they must in a civil point of view be held as responsible as if they had asserted that which they knew to be untrue." This short axiom is one which all architects and builders should carefully bear in mind, especially as Mr. Justice Fry observed that because the defendant in the present case was an architect it was peculiarly his business to have made himself acquainted with the state of the house before making assertions about it. It would not be difficult to multiply examples to make the law more clear; but the case under discussion exemplifies the principle as well as any number of repetitions of similar facts.

It should not, however, also be forgotten that the damage or injury received by the representee must be proved by him to be the direct consequence of the false representation, and apparently in this case Captain Cutler made out his case to the satisfaction of the judge. Not having gone into the evidence, it would be presumptuous of us to attempt to adjudicate upon the judge's view of the facts placed before him. Presuming, as we do, that he was right in considering that the diphtheria was the result of the ineffective drainage of this house, it shows that the necessity for architects and builders to remember the law as to representation is vitally necessary. And further, it is also advisable to point out that Mr. Justice Fry considered the representation of Hill, the house-agent, as the representation of Mr. Mantell, because, though the house in question had not been placed in this gentleman's hands, yet his agency was adopted. But this opens a wide field for useful discussion in relation to the law of principal and agent. It is enough for our present purpose to treat both Mr. Hill's and Mr. Mantell's letters as the representation of the principal, and the facts standing thus exemplify with unshadowed distinctness a legal principle of the utmost importance to those who are engaged in dealing with house property.

PROJECTED PUBLIC WORKS.

NEW RAILWAYS, TOWN IMPROVEMENTS, PIERS, AND HARBOURS.

ALTHOUGH the private Bills to be investigated during the next session of Parliament are numerically less than those of last session, being 137 as compared with 149 in the previous year, the labours of the several Parliamentary Committees during the session of 1880 are likely to be heavy, inasmuch as many of the Bills are of an important character, and a strong opposition is already threatened to several of the projects. It is worthy of notice that town improvements of a very comprehensive character, in several of the great commercial and manufacturing centres in the country, form a large contingent of the general list, there being no fewer than twelve such projects promoted by the municipalities of large towns, in which powers are sought for the erection of new public buildings, the construction of new streets, and various other additional sanitary powers.

Of the seventy-one Railway Bills, fifty are promoted by existing companies for the construction of new lines and other works in connexion with their respective systems, a special feature in the Bill of the London and North-Western Company being a clause for powers to double their line in several counties through which it passes. This course has now been pursued by the company for several years past, and it is understood that it is to be continued until the whole of the line between London and Lancashire and Yorkshire will have two double lines of metals entirely separating the passenger from the goods traffic. There are twenty-one Bills for the construction of entirely new lines of railway by companies to be incorporated. The number of Tramway Bills is twenty, and in addition there are forty Board of Trade Provisional Orders for powers to construct tramways, being a total of sixty applications for works of this character. There are seventeen Bills in connexion with the construction of docks, piers, and harbours, together with a numerous list of gas and water Bills. Most of these last-named Bills are for powers to extend existing works. The most important amongst this class of Bills is that promoted by the Liverpool Corporation, which seeks powers to obtain an extensive water supply from the rivers Vyrnwy, Marchnant, Afon Cowny, and other streams in the county of Montgomery, a distance of upwards of sixty miles from Liverpool. There is every reason to believe that this Bill will produce one of the most determined contests in the committee-rooms during the coming session. It is to be opposed by the River Severn Conservancy Board, and also by the Corporations of Worcester and other municipalities, on the ground that the Severn will be injuriously affected by the proposed works.

Twenty-five of the Bills have reference to projects affecting the metropolis. Amongst these is a Bill promoted by the Government on behalf of the Postmaster-General for powers to purchase houses and land at Buckingham-gate for the purpose of enlarging the present South-Western District Post-office, or erecting an entirely new building for post-office purposes. ——The Southwark and Vauxhall Water Company apply for powers to purchase land for the erection of a new pumping-station and two reservoirs at Hampton, one of the proposed reservoirs being 19 acres in extent, and the other 7 acres. Also for powers to construct a new covered reservoir at Kingston, of 9 acres, and another covered reservoir in Streatham, 11 acres in extent, together with aqueducts in Lambeth and Croydon. —— The Kensington Vestry promote a Bill for powers to widen a portion of Church-street, from the east side of Holland-street to Duke's-lane. Also for powers to widen High-street, Notting-hill, from the north end of the west side of Kensington Palace-gardens, to the north end of the east side of the Mall, Notting-hill, at the junction of the Mall with High-street, Notting-hill. Also for powers to widen Plough-lane, Kensal-green. —— A company to be incorporated have a Bill for powers to supply sea-water to London by constructing conduits, reservoirs, and pumping-stations between London and Lancing, in Sussex, the water to be taken from the sea at Lancing. The conduits and other works are to terminate at Fulham, at the junction of High-street and Church-street.——The Phœnix Gas Light and Coke Company promote a Bill seeking powers to purchase 60 acres of land in one part of Greenwich, and 26 acres of land in another part of the borough, for the purpose of erecting new gasworks; also for powers to supply cooking and heating apparatus, stoves, fittings, and machinery. —— The Metropolis Water Purchase Bill provides for the compulsory sale of all the metropolitan companies by a body to be designated the Metropolitan Water Trust. The Bill also contains clauses giving the Trust powers to supply water beyond the limits of the existing companies. —— The London Steamboat Company apply for powers to make arrangements with one or more railways or steamboat companies for the fusion of the undertaking of the company with such other railway or steamboat companies; also powers to acquire the plant and boats belonging to other steamboat companies, and to perform the river and sea services of such companies. On the other hand, powers are sought in the Bill to sell or lease the undertaking to the General Steam Navigation Company, or to the London and Brighton, the London, Chatham, and Dover, the South-Western, or the Great Eastern Railway companies. There is also a clause in the Bill giving the company powers to purchase any of the piers and landing-places along the Thames, and to construct new piers.——The most important Bill connected with the metropolis is that promoted jointly by the Metropolitan and Metropolitan District Railway companies for the completion of the Inner Circle Railway, and which is to encounter a strong opposition unless arrangements can be made with the Corporation and the Metropolitan Board of Works in reference to the construction of new streets in the City. It is designated the City Lines Extension Bill, and provides for deviations from the Act passed last session. The Bill contains clauses enabling the two companies to purchase lands and houses on the north side of Eastcheap, lying between the National Provident Institution and Rood-lane; also powers to purchase lands and houses abutting on the north side of Little Tower-street, on the south side of Great Tower-street, and on the east side of the Minories. The Bill contains clauses to the effect that the companies shall be at liberty to make the line within the lines of deviation, and to carry it under any houses or buildings, cellars, and vaults, without being compellable or obliged to purchase any such houses or buildings, or any neighbouring houses, cellars, or vaults, on the sites thereof; nor to be compellable to purchase the whole or more than such portion of any house as they may actually require and take for the railway. The Bill, which, if passed, will jeopardise the construction of the new streets provided for in the Inner Circle Completion Act of last session, has already excited a strong opposition amongst the City authorities, and at a recent meeting of the Court of Common Council it was strongly denounced. Mr. Deputy Lowman Taylor observed that no matter how clever a corporation might be, it would never be a match for Sir Edward Watkin or Mr. Forbes. These railway companies, he said, had broken faith. The public authorities had found, with surprise and indignation, that the railway companies were going to Parliament again upon this question. He regretted to say that the committees of the House gave these railway companies their ear much more than they should do. Mr. Deputy Young observed that the Act of last session gave the companies power to schedule and acquire the property on the south side of Eastcheap and Little Tower-street, and on the north side of Great Tower-street to Mark-lane, where it was intended the new street should be formed; but by the proposed Bill the company had scheduled the whole of the property on the north side of Eastcheap, and both sides of Little Tower-street. They had made the extraordinary application of asking for leave to vary, extinguish, and destroy any agreement they might previously have made. In looking through the Bill he failed to see any provision for a new street, and this was a matter which would have to be pointed out to the House of Commons. If the companies should fail to carry out this improvement the onus of non-completion would rest upon them, and not on the public authorities. Amongst the other Bills connected with the metropolis is one by the St. Luke's Vestry, for powers to sell land for building purposes; by the Metropolitan Railway Company for a deviation in their Kingsbury and Harrow line, now in progress; a Bill for powers to make a railway from Hounslow to join the Metropolitan District line at Ealing; a Bill for powers to construct a railway from Sloane-square to Knightsbridge;

likewise Bills for the construction of railways from Vauxhall to the Broadway, St. James's Park, and from the Chelsea Station of the West London Extension Railway to the Metropolitan District, near Sloane-square; likewise a Bill, by the Metropolitan District Railway Company, for powers to extend their line from Ealing to Uxbridge; also a Bill, by the South-Eastern Company, for powers to purchase land and buildings in Buckingham-street and Duke-street, in order to enlarge the Charing-cross Station. There are also seven tramway Bills, with powers to construct additional tramways in different parts of the metropolis.

The Town Improvement Bills include one promoted by the Corporation of Preston, containing powers with respect to the purchase of a site for the intended free library and museum; a site for industrial schools; powers to construct new streets and other improvements; also to purchase land for public parks and recreation-grounds; likewise extensive sanitary powers with respect to the ground-floors of houses, the construction of cellars, prohibition of certain cellars and basements. The Bill also contains clauses providing for new houses not to be occupied until certified by the authorities; for the prohibition of wooden houses; clauses giving the Corporation control over the workmanship, materials, foundations, elevations, drainage, and ventilation of houses.——The Lancaster Corporation promote a Bill for powers to widen ten new streets and to construct four new streets; also providing that old buildings in streets taken down be re-erected in line of streets as laid down by the Corporation.——The Stafford Corporation likewise seek powers to purchase land for a public park, and also powers to widen and construct several new streets.—— The Burton Corporation promote a Bill in which powers are sought for the purchase of land for the construction of a sewage farm, with filter beds, depôts, and all necessary buildings for deodorising, manufacturing, and converting sewage into manure. The Bill also contains clauses preventing the occupation of dwellings in any new street until such street has been drained and paved to the satisfaction of the Corporation; also preventing the first occupation of any dwelling-house until the granting of a certificate by the Corporation that such dwelling-house is in accordance with the building bye-laws. There is also a clause in the Bill compelling the owners of unoccupied houses to maintain the same so that they shall not be a nuisance or injurious to the occupiers of adjoining houses.——The Oldham Corporation promote a Bill seeking powers for the extension of the borough boundaries, the enlargement of the town-hall, powers to construct new waterworks, powers to widen fifteen streets and to construct eleven new streets, powers to prevent the erection of houses in courts, and prohibiting lock-up shops, workshops, sheds, or other places of business being used for the purposes of habitation. The Bill likewise contains a clause empowering the Corporation to erect public water-closets, urinals, and lavatories, and to charge for the use of the same. There is also a clause giving power to the Corporation to purchase land for parks and recreation-grounds. ——A new company apply for powers to erect a new town-hall, with market-house, warehouses, and shops, at Aberdare.——The Huddersfield Corporation apply for powers to make fifteen new streets and to widen several others; powers to provide dwellings for the labouring classes, and persons removed from cellars and overcrowded dwellings. There is also a clause providing for the erection of a new covered market, and another enabling the corporation to purchase land for the construction of sewage works.——The Birkenhead Corporation promote a Bill giving them power to make better provision for the drainage of the borough, and to regulate the levels, foundations, and basements of new houses to be built; also powers to pull down and rebuild ruinous houses, and to erect public mortuaries and slaughter-houses. Large powers are likewise sought for the erection of a spacious new town-hall, with council-chamber, public rooms, and all necessary offices, including court-rooms and police station-house. Powers are likewise sought for the erection of baths and wash-houses.——The Wigan Corporation have a Bill with powers to purchase land for the erection of a new town-hall, suitable for all municipal and other public purposes. The Bill also contains a clause empowering the corporation to purchase land in different parts of the borough for the widening of streets. A further clause empowers the corporation to lay out for building purposes any land which may be acquired by them under the Bill. There are also powers in the Bill to make better provision for the sewerage of the borough, and for the purification and utilisation of the sewage; and also for the erection of public baths and wash-houses.

The Bills relating to docks, piers, and harbours include, amongst others, one for the construction of a tidal basin, a dock, and other works in the parish of Dagenham, Essex, in proximity to the London, Tilbury, and Southend Railway. This project involves the embanking of a considerable length of the foreshore of the Thames. There are also Bills for the construction of new piers at Broadstairs, Llandudno, Aldrington, Bray, Tralee, Castle Bay, and a promenade pier at Weymouth, together with sea-wall and landing-place for the embarking and landing of passengers. The proposed pier is 1,200 ft. in length.——The Bristol Port and Channel Dock Company apply for powers to construct a new lock and cut. ——For the Clacton-on-Sea Special Drainage District there is a Bill for powers to construct a sea-wall on the shore, in front of Clacton-on-Sea; also a promenade for foot-passengers, extending along the entire length of the sea-wall. ——The Rochester Corporation, in connexion with the Medway Dock Company, apply for powers to construct an embankment on the foreshore of the Medway, for the protection of the lands and property on the banks of the river. —— The Milford Docks Company apply for powers to construct a breakwater and landing-place.——The Drainage Commissioners of the river Witham apply for powers to construct a new channel for improving the outfall of the river Witham, together with all necessary embankments, bridges, arches, culverts, and sluices.

MENACE TO SOUTH LONDON BY THE STEADY RISE OF THE HIGH-WATER LEVEL OF THE THAMES.

THE question of increase in the rise and ebb of high and low water in London is one to which we have, on more than one occasion, directed attention. It is one that has excited debate, perhaps not altogether impartially conducted by the advocates on either side, with reference to the flooding of the low-lying portions of the metropolis contiguous to the river, and to the greater or less effect of the Thames Embankment in raising the level of high-water. We have no intention of raising that controversy anew at the present time. But to all persons interested in metropolitan house property, especially in the district above indicated, it is very important that the facts should be known. Mr. J. B. Redman, whose knowledge of the river Thames has, as we can ourselves bear witness, extended over a period of nearly forty years, has made a valuable communication to the Institution of Civil Engineers as to the change in the level of the river. He has tabulated the extreme ebbs exceeding 20 ft. below Trinity standard, from the year 1833 to 1879, and he has made a comparison of the register of the tides kept at Sheerness, and at the old or Upper Shadwell entrance of the London Docks. The average of range shown by these observations is worthy of note. The growing tidal action is illustrated by the increased differences between high and low water at the two stations. Up to the year 1874 the maximum difference in the level of high water at these two points that has been recorded is 6 ft. 4 in. But on the 17th of April, 1877, with a gale from E. to E.N.E., a difference of 6 ft. 11 in. occurred. Again, on the 24th of December, 1877, with a westerly gale, low water was 3 ft. 11 in. lower at London than at Sheerness.

The number of ebbs below 20 ft. under Trinity high-water mark have greatly increased; and on the 21st of January, 1878, the tide ebbed, with a south-west gale, down to the unprecedented depth of 23 ft. 2 in. below Trinity high water. The high water of an ordinary spring-tide is now 10 in. or 12 in. above the mark; an equinoctial spring tide, 2 ft. higher; and abnormal tides, with heavy land floods, and northerly equinoctial gales, have attained to 4 ft. and 4 ft. 6 in. above the datum, or 9 in. in excess of any previously recorded.

Thus an increased range of 16 in., or 7 in. in ebb, and 9 in. in flood, has been recorded as to the movement of the Thames. The mean low-water of the entire year is now 1 in. lower; the mean high-water, nearly 3 in. higher than in any year prior to 1875. The average increased elevation of high-water at London above that at Sheerness is between 4 in. and 5 in. For the metropolitan residents the increase in maximum rise is the most important consideration, as it is that which determines the danger or the destructive effect of floods. But considering the possibility of the coincidences of wind, tide, and land flood to produce, at any time, an abnormal height of water, it is obvious that too much attention cannot be given to observations which show a steady and ascertained increase in mean range, and that especially in mean height, of average spring-tides.

THE WORK OF THE SCHOOL BOARD FOR LONDON IN RELATION TO SITES AND BUILDINGS.

INSTITUTION OF SURVEYORS.*

THE work of the School Board for London can excite professional interest among members of the Institution of Surveyors chiefly in so far as it relates to the acquisition of sites. Other matters may be cognate, yet possibly beside the question. They may be of the most burning general interest, yet devoid of features suited for discussion in a professional assembly. They may cover certain professional ground, and yet be beyond the scope of subjects belonging peculiarly to the surveyor. Thus, the planning and designing of the buildings themselves, involving many questions, scientific or artistic, may be important and interesting to the architect. The "cost per head" of those buildings may be the result of a curious form of calculation dear to the doctrinaire. The amount of educational destitution may, in turn, appear in the eyes of a philanthropist to be the only point worthy of serious notice. These, and a thousand other questions, may be let alone, except in so far as they are inseparably interwoven with the present subject, illustrate the difficulties to be met and surmounted by the professional surveyor, throw some new light on the economical aspect of a great work, or, above all, contribute to a knowledge of the value of real estate in London, and to the profesional practice connected therewith.

It may be that, beyond the actual buying of the land for sites and the buildings (if any) thereon, including (as that would) the freeholds, leaseholds, tenancies, trade, and any other interests, some may wish to glance at the subject as a whole. This may incidentally open up such subjects as the cost of the buildings, the pressure on the taxpayer, the charges on capital as compared with those defrayed out of income. And, in this way and to some extent, the cost of annual maintenance and of the teaching staff may come into distant view. Our main object must, however, remain the same,—viz., not so much to open up questions instructive to the educationist, or irritating to the ratepayer, or both, as to dwell on those likely to prove interesting to the present assembly.

The usual scope of a professional paper is, or should be, to carry the existing knowledge of some branch of science or art a few steps further. In the present instance I cannot pretend to do this. The School Board problem is yet a new one in England, and comparisons with similar problems in other countries fail of practical application from the very different set of conditions under which they arise, and would serve no useful purpose if set forth. I propose, therefore, to lay before you merely a short outline of that professional labour which must precede the educational work proper of the London Board, together with such records and tabulations as may hereafter prove useful for reference.

The purchase of so many pieces of property of different kinds, and in so many different parts of this huge metropolis, by the same public body, may of itself form a subject of sufficient interest and importance to need no apology for its introduction here. I am the more persuaded that such may prove to be the case, from the fact that so many eminent surveyors, members of this Institution, have borne their share in the work, either as negotiators, witnesses, advisers, opponents, arbitrators, or umpires, and that these gentlemen can con-

* From a paper read by Mr. E. R. Robson, on Monday evening, the 5th inst., Mr. Edward Ryde, vice-president, in the chair.

tribute much valuable information by taking part in the discussion. . . . . .

The district within which the Board has jurisdiction is, by an order of the Education Department of the Privy Council (contemplated by the Act), co-extensive with that of the Metropolitan Board of Works. It includes Holloway and Hackney, on the north; Hammersmith, Starch-green, and the whole districts of Fulham, Wandsworth, and Tooting, on the West; reaches down to the Crystal Palace, on the south; and, embracing Eltham and Plumstead, finds its eastern boundary on the northern side of the Thames at the river Lea. This district may be approximately described as having an extreme length from east to west of fourteen miles, and from north to south of ten miles. It will be given in greater detail later on.

The Education Act of 1870 incorporates the Lands Clauses Consolidation Act of 1845, and thus the purchase of property for school sites takes place under precisely the same conditions as in any other case where land is scheduled by a public body under the latter Act. But the preliminary procedure,—that is to say, the method of setting to work in order to obtain compulsory Parliamentary powers,—is somewhat different, inasmuch as the Bill is promoted, not through the usual preliminary investigation of a Committee of either House, but under the authority of the Education Department of the Privy Council, and, in fact, as part of a Government Bill.

The plans of the various properties scheduled, as well as the book of reference, are made to conform to Standing Orders, but, when ready, are deposited with the Education Department. The notices to owners and occupiers (section 20) must be published during three consecutive weeks in the months of October and November, or either of them. The objections (if any) to the proposed compulsory taking of property are heard by the Education Department, who for this purpose take the place of a Parliamentary Committee, receive complaints, obtain answers from the School Board, and give decisions after having obtained reports from their own inspectors. They can, also, if they think fit, hold a formal inquiry. Objection can, of course, be taken by any member of either House at either of the proper stages during the passage of the Bill, but, failing any successful exercise of this privilege, the Bill becomes law in due course. . . . .

The actual powers seen to be possessed by the School Board may be really great; but they are not granted without the most searching investigation on the part of the Government. The Board cannot buy any site or property out of its capital account (*i.e.*, out of money borrowed on the security of the rates, the repayment of the capital and interest on which is spread over fifty years, or a shorter term) without having first proved to the satisfaction of the Education Department the existence of an absolute deficiency of school-accommodation in the neighbourhood, and, in consequence, a necessity for a school-house. On being so satisfied, authority is given to build for a given number of "school places." Plans of each of the proposed sites are deposited, and the Department, through their inspectors, closely scrutinise the position and surroundings of each, whether its compulsory taking be opposed or not, the main objects being to see that the vested interests of existing public elementary schools are not wantonly trespassed upon, and that public money is not wasted. The Department further regulate the amount of land to be taken, never permitting a less quantity to form a site than a quarter of an acre, without very strong reasons as to cost, &c., being shown. They also exercise, at a later stage, a vigorous control over the plans for buildings.

The preliminary stages being all successfully passed, and the Bill having received the Royal assent, the various interests are acquired in the manner laid down by the Lands Clauses Act. The processes under this Act are so familiar to members of the Institution that it is not necessary to enter upon them so far as they have formed part of the usual routine. One or two special instances may, perhaps, be recorded, but, as a whole, the peculiarities of practice, arising under the Act, have not been numerous in the work of the School Board.

With the acquisition of compulsory powers the real work of buying the sites and building the schools is begun, the most urgent cases being, of course, attended to first. Yet many sites have already been purchased without compulsory powers, for it is the invariable experience of all public corporations and railway companies that property so acquired is acquired on more favourable terms. It has been the practice of the Board (in common with many public bodies) to remember the frequent difficulty of making a freehold title after property has been agreed for and all details settled, and to invoke the potent aid of the Act to this end by embracing as much as possible in the schedule, and thereby overcoming the disabilities of vendors.

Proceeding now to give some definite idea of the work performed by the School Board for London, it is necessary, first, to show the source and nature of the funds with which the Board are supplied. Table A* accordingly gives the superficial area and rateable value of each of the ten divisions into which, for School Board purposes, London has been divided. Every one knows that the Board defrays its cost out of the rates, and that the annual produce of a London rate increases; but few would have expected to find the important fact which is set out in this table,—viz., that the entire rateable value of the metropolis, which in 1869 had stood at 16,257,643*l.*, had risen in 1874,—five years later,—to 20,903,377*l.* It may also be mentioned, as another form of illustrating the increase in the rateable value, that the penny in the pound, which in 1869 represented, in round figures, 80,000*l.*, now in 1879 produces, in round figures, 100,000*l.* The school rates are collected for the Board by the Vestries and District Boards of Works.

Second only in statistical importance to the the source of the funds supplied, is the population with which it has to deal, and the comparative increase of the latter within the Board's district. Table B * shows the number of population in 1861, and again 1871, as vouched by the Registrar-General, the increase during the decade being no less than 457,983 persons. This part of the table forms a kind of basis on which to found a calculation of the probable increase during those years in which no census had been taken. The result is set out, as to 1876, for what it is worth. It is noticeable that the district of Westminster shows some decrease, while the enormous depopulation of the City, between the years 1861 and 1871, can only be attributable to the wholesale demolition of small house property for public improvements occurring in one particular decade, and not likely to occur again, at least not to the same extent. All the other districts, however, show an increase of population, some of them to a remarkable extent. And as it is probable that the exodus from the City did not cause people to remove beyond the limits of the metropolitan district, the net result of the table may, after all, be found sufficiently correct to serve for the present and until the next census, in 1881, enables us to exchange theories for facts.

The third table, C, begins to deal with the actual operations of the Board, and shows the number of sites purchased in each year by the Board since its formation in 1870, the cost of purchase in each of the school divisions, and the total.

Table C.—School Board Sites.

Division.	Number of Sites in each Division.	Area of Sites in each Division.	Cost. Property including Trade Interests (if any).	Cost. Legal and Surveyors' Charges.	Cost. Total.	Average Size of Sites in each Division.	Average Cost per Foot super. in each Division.
		Sq. Feet.	£ s. d.	£ s. d.	£ s. d.	Sq. Feet.	s. d.
City	1	7,190	8,128 0 0	787 5 6	8,923 5 6	7,190	22 7½
Chelsea	23	631,059	95,211 17 5	13,198 8 8	108,410 6 1	27,002	3 0¾
Finsbury	33	602,060	238,101 9 5	38,314 10 0	276,415 19 5	18,814	7 10¾
Greenwich	25	665,167	62,585 14 1	11,411 6 0	73,997 0 1	26,606	1 10½
Hackney	34	608,210	175,692 16 0	30,715 7 3	202,408 3 3	19,653	5 3
Lambeth	59	1,103,493	183,468 11 4	27,238 3 0	210,706 14 4	22,609	2 1
Marylebone	17	350,461	129,985 18 2	20,401 3 10	150,387 2 0	20,614	7 5
Southwark	26	652,026	126,447 12 5	14,587 12 4	141,035 4 9	25,078	3 10¾
Tower Hamlets	41	934,005	174,548 10 3	23,503 19 4	198,052 9 7	22,536	3 9¼
Westminster	3	20,097	38,342 19 6	4,711 11 6	43,054 1 6	9,699	2 7½
School Board District	252	5,685,768	1,231,592 19 1	189,869 7 7	1,412,372 6 8	(a)22,502	(a)4 2¼

(a) These show the general average over the *whole School Board District*.

Of these purchased sites, twenty-six are not those originally scheduled, but have been adopted as alternatives; while fifty-seven others, not included in the list, have been withdrawn because of objections of one kind or another.

As to relative cost, the cheapest site has been that in Bolingbroke-road, Battersea, where 54,426 square feet of land were obtained for 660*l.*, or 2¼*d.* per square foot; and the dearest, that in Barrett-street, Oxford-street, which cost the Board 16,204*l.* 16*s.* 1*d.*, including all expenses, except legal and surveying fees. The area being only 5,200 square feet, it follows that the price per foot was 3*l.* 2*s.* 2½*d.*, in fee simple. The average cost per foot, taking all London together, has only been 4*s.* 2¼*d.* The burden on the rates has been ·57 of 1*d.* in the pound.

This third table would have been more instructive and valuable had it been possible to separate the compensation paid for the actual land and buildings (including all holdings) from that strictly belonging to trade, and forming what is known as "trade interests." Amid so many awards from arbitrators, and verdicts from juries, it has been found impossible to separate these items properly, and the result can, therefore, only be given in gross. It is, however, made exclusive of legal and surveyor's fees, which are stated in a separate column. In addition to the sites shown in the table, nineteen more are scheduled for the coming session of 1879-80, besides portions of land for enlargement.

The total cost of the 220 school-houses erected, with their sites and furniture, has been over three millions, varying in "cost per head" from 5*l.* 7*s.* to 16*l.*, for building only. Increase in cost of buildings has arisen from the combined effect of a large number of causes, which may be classified under three main heads,—viz., (*a*) The great rise in prices; (*b*) the greater size of sites and consequent formation and enclosure; and (*c*) the developed ideas concerning education and its necessities. It is true that there is another increase in cost so far as the ratepayer is concerned, which is not an increase so far as value of artificer's work is meant. I allude to the increased area and cubical content now given to the boys' and girls' schools at the instance of the Education Department. The Board had, before commencing any building operations, decided not to allow a less superficial area per child in these two kinds of schools than 9 ft. In practice, this minimum had been treated as a maximum, and school accommodation came to be computed on this 9 ft. basis. Within the last two years the Education Department having required that the computation shall be made on seat accommodation, limited the number of desks to five rows deep, and have required the rooms to be 22 ft. wide. The net result is that the area per child, which formerly was 9 ft., is now between 10 ft. and 11 ft. It is an improvement on sanitary grounds; but it is an increase of "cost per head."

It is a common ground of complaint against the School Board that they proceed recklessly, buy too much property, and build too many schools. The fact is, that the first twenty sites, scheduled under a resolution by Lord Sandon, when a member of the Board, were the only cases to which such a charge, even in theory, could have applied. They were decided upon comparatively at random, so far as general locality was concerned. The want appeared so great and the need of action so urgent that it was felt impossible to wait for the completion of elaborate statistics, and accordingly a commencement was made without this preliminary. The work has now, however, reached a much higher state of organisation. The divisions of London are again subdivided by the School Board into many blocks, each having a distinctive letter, and in each block the School Board officer does his best to know the home of every child. Conflicting opinions as to whether land is, or is not, to be bought for a site, are thus brought in each case to the test of facts and

* For these tables, together with Tables D and E, hereafter referred to, we are unable to afford space, but they may be consulted in the "Transactions" of the Institution.

statistics; and objections, whether raised by property-owners, persons interested in existing public elementary schools, or by the Education Department itself, can be met on solid ground.

The work of the Board has grown much larger than the framers of the Act ever contemplated. This, not from any desire to extend, but from the simple necessities of the case. Until the Board began its work, the number of poor children growing up neglected in London alone was merely guessed at. It was thought to be perhaps 100,000. By degrees this guess was shown to be far below the mark. And the numbers now actually in the Board Schools are:—

In premises transferred permanently to the Board	19,315
In 220 new school-houses built by the Board	174,709
In temporary premises, to be shortly replaced by new school-houses	16,204
Total number of children	210,228

It is further calculated that, when the whole existing educational deficiency is supplied, the increase of population alone will probably require some eight or ten additional schools per annum.

These figures may here be appropriately followed by statements (Tables D and E) showing the income and expenditure of the Board down to 1879, which cannot fail to demonstrate the magnitude of the work done, the scale of which will now soon dwindle to what may be called normal proportions, as arrears become wiped off. Table E includes both capital account and current account, and should be scanned with that fact always in mind. The former is a small charge on the rate, the latter a large one.

In turn, these last statements will afford some explanation of the steady increase in the annual rate levied on behalf of the Board. The facts and figures, as a whole, must show conclusively that, for some time at least, that increase must go on in spite of the exercise of a most rigid economy, unless the work of the Board is to be stopped.*

"A RULE" OF PROPORTION.†

MR. JOHN MARSHALL, the eminent surgeon, and lecturer on anatomy at the Royal Academy, who has for many years specialised some of his scientific knowledge for the information of students of the plastic art in his "Anatomy for Artists," has just given to the world "A Rule of Proportion of the Human Figure," accompanied by carefully-executed illustrative diagrams by Mr. Cuthbert. The author does not state whether the measurements given in his "Rule" are derived from a series of actual measurements from life, or whether they are founded upon some *à priori* conception of what these should be in the ideal or typal human form. But whatever Mr. Marshall puts forward, after his long devotion to the interests of art, must be gratefully acknowledged, and deserves to receive respectful and careful consideration.

The following is Mr. Marshall's own statement of the objects he had in view in producing the work:—

"The 'rule' does not aim at establishing or demanding entirely new proportions, but at indicating an easy method of determining and defining them. When tested by the average measurements given by Quetelet, Carus, Liharzit, and others, due allowance being made for national differences, the proportions of the 'rule' also exhibit, with the exception of peculiarities in the size of the head and face, a very close agreement with Nature. The illustrative plates of the male and female figures which accompany these pages have been drawn from two well-known models, one of whom was a few years since, whilst the other is at the present time, a favourite in our studios; so that it may be said these models have not been selected by me, but by contemporary artists. The drawings have, moreover, been made as faithful as numerous and careful measurements could ensure; and, it may be added that that of the male figure was completed many years since for my lectures at Kensington; long, therefore, before I contemplated working out this 'Rule' of proportion."

The study of the proportions of the human figure is a very interesting one. A rule of proportion is given by Vitruvius as that which was observed by the ancient Greek artists. This canon was published, accompanied by diagrams by the late Joseph Bonomi, and with it John Gibson's diagram for obtaining the proportions of the human figure; but all writers, from Vitruvius downwards, except Quetelet, omit to give the data on which their "rules" are founded, and we fail to obtain any satisfactory answer to the question, why this or that rule should be adopted? The subject of proportion is one which has from time to time been brought before the readers of the *Builder*. A discussion followed a letter of Bonomi's which appeared in this journal on the subject of human proportions.

There is an Anthropometrical Society somewhere in the United Kingdom,—we believe at Bristol. The results of its labours are unknown to us; its work, however, has doubtless not been labour in vain.

Of course, any "rule" of proportion given as a standard could only serve as a general or typical rule to artists, and as a test by which to determine whether they may, under some laxity of vision, whilst drawing or modelling the figure, have run into extreme disproportion. On this point Mr. Marshall says:—

"Regarded from an artistic point of view, the 'rule' harmonises with, and therefore represents, types or standards of the male and female figures. But as individual examples in nature undoubtedly deviate from these, as from other standards, so the artist may, and should, diverge from them, according to the necessities imposed upon him by speciality of subject, object, or character. This, indeed, is a right of the imaginative and creative faculty of the painter and sculptor. The 'rule,' however, may be regarded as the result of scientific realism, from which the idealist may take a safe point of departure, and by aid of which he may feel the limits within which he should be restrained."

Mr. Bonomi had designed an "anthropometer" for taking measurements of the figure, and we were ourselves on one occasion very forcibly struck by the differences of proportion exhibited by several individuals, measured in succession by that instrument. In fact, he proposed to use the anthropometer for the purposes of identification, as every individual may be said to have an idiosyncracy of proportion. Amongst the individuals measured in our presence was a railway-porter, who manifested an excessive length of arm. May not human proportions vary as the grades in evolution, and this length of arm and other traits indicate either approximation or divergence from the Simian type?

We could wish that artists themselves would exhibit as much zeal as Mr. Marshall in investigating the laws of proportion, for many of its problems have yet to be solved. We do not even exempt architects in this wish, for Michelangelo laid great stress upon the importance of the knowledge of human proportion, and attributed excellence in architecture to the possession of this knowledge.

The novelty in the "rule" is that Mr. Marshall implies something very different by the expression, "height" of the human figure, from that which is generally understood. Let him speak for himself.

"The stature, or standing height of man, is obviously composed of the longitudinal measures of quite dissimilar, or so-called heterologous portions of the body, being dependent partly on the length of the axial portion, which includes the head, neck, and trunk, and partly on that of the lower limbs, which are appendicular structures. Moreover, it is plain that neither the whole length of the axis nor the whole length of the lower appendices enters into the stature; for these two portions of the frame overlap each other at the pelvis, so that either the lower part of the trunk or the upper part of the thigh must be regarded as not participating in the stature, measured from the sole to the crown of the head."

"Hence, the apparently simple datum,—the height of the body,—so easily determined, and so constantly employed for anthropometrical, ethnological, and artistic purposes, is, in reality, a complex factor, and, unless duly analysed, is an unsatisfactory, because a composite, element of comparison."

This is doubtless the case from the scientific anatomist's point of view. We must not, however, forget that proportion in the human figure from the æsthetic point of view consists either in the beauty or fitness of proportional relation to taste, and of such relations the educated eye is arbiter. The artist is, nevertheless, safer, more intelligent, and masterful when he superadds knowledge to feeling in these matters. It is for this reason that artists ought to possess themselves of a "rule" of proportion of the human figure.

HOW THE SNOW TROUBLED PARIS.

WE have been so accustomed to hold up to admiration the superior method and system of all things relating to municipal matters in Paris that some particulars of what occurred there during the late inclement weather may not be uninteresting, and at the same time may serve as a lesson.

Surprised in an unexpected manner by the sudden arrival of the snow, the service of the "*viabilité*" did all that it was, humanly speaking, possible to do to clear the public thoroughfares, and knowing that the ordinary staff was insufficient for this exceptional case, it made use of all those of the unemployed classes it could gather together, and engaged all willing to work. But irregular aid like this is but of little use. These stray "hands" are inexperienced; they possess arms certainly, but very little intelligence; and when in gangs hinder each other mutually, and when isolated escape from surveillance, and the work gets on but slowly, as statistics prove.

The service for the public streets of Paris comprises two divisions, each composed of ten arrondissements; the first itself is sub-divided into three sections, the second into five. The first division is under the direction of the engineer-in-chief. The sections are subordinate to other officers.

Every day a recapitulative statement was drawn up in each of the sections as to the means employed in workmen and carts and the corresponding expenses, and transmitted to M. Alphand.

For the first division, the centre of Paris (comprising the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, and 10th arrondissement), they were able to get together 9,250 workmen, and 1,576 carts drawn by 2,600 horses. The carts, which were drawn by one, two, and sometimes three horses, were paid by the day, and, as the case might be, at the rate of 12, 18, and 24 francs.

The carts of the first division each carried about two cubic mètres of snow, and accomplished about four trips in a day: thus, allowing eight cubic mètres a day for each cart, this would make in all about 12,000 cubic mètres a day.

Up to the 21st of December, beyond which date we have not been able to procure any information, the clearance of the snow from Old Paris stood thus:—

	Cubic Mètres.
Snow carted to the Seine	310,000
Snow thrown into the gutters, 800 mètres a day, about	8,000
Total	318,000

That cost 970,000 francs (about 38,800*l.*). We ought, of course, to add that these figures include all the snow of the approaches to the Seine.

In the second division, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, and 20th arrondissements, they had 2,400 carts, 2,400 wagoners, 4,800 horses, and 8,000 workmen furnished with spades and pickaxes. The carts unloaded at the canal or on waste ground near the fortifications. That allowed of more frequent trips, each cart making six per diem.

	Cubic Mètres.
Result up to the 21st of December	352,000
Which, added to the contingent of the first division	318,000
Gives for Paris a total of	670,000

Thus in sixteen days they cleared away 670,000 cubic mètres. Now, after the estimate of statisticians, there fell in Paris about 7,000,000 cubic mètres!

Besides carting away the snow, several other means were put in requisition; for the hardened snow, which rose in undulations underneath the horses' feet, and rendered the circulation of carriages so difficult, they tried harrows; but these produced no effect. They slid over the snow without cutting into it. They tried to melt the snow with steam-engines; but this gave no tangible result,—we should be disposed to think through unsatisfactory arrangements. They sent the cylindrical compressors, with

* The remainder, together with some notes of the discussion, in our next.

† A Rule of Proportion of the Human Figure. By John Marshall, F.R.S., F.R.C.S. Illustrated by John Cuthbert. Smith, Elder, & Co.

which they break the stones for the macadam, up and down. These heavy machines, the most massive of which weighs 30 tons, produced no other effect than to render the roads smoother, harder, and more slippery. Had they persisted it would have transformed the boulevards into a veritable skating-rink, and, as gravel is wanting, that would have been terrible. Last of all we come to the employment of salt, the use of which has been experimentalised upon by M. Humblot in the Avenue de Clichy, with rather good results, and it was, thanks to employing this article, that some of the tramways were kept available; but for one line alone it required 20,000 kilos. of salt, which cost 4,400 francs. This expense leaves room for reflection; and even if there was no hesitation as to the cost of all this, there was not salt enough in Paris to melt the ice in all the streets.

A great deal of money was spent, but no one seems to complain, and in the long run the result was satisfactory. The pavements have in many parts regained their ordinary appearance.

The state of Paris seems to be becoming every day more disastrous. The rising of the Seine, the masses of floating ice beating against the bridges, is all bad enough; but great uneasiness seems to be felt as to how the public health may be affected if the heaps of snow, mixed with the scourings of the streets, now a thaw has commenced, should emit foul gases. They say no one doubts the goodwill or energy of M. Alphand, director-in-chief of the works of the city of Paris; but the obstacles he has to contend with seem invincible.

Typhus fever, they say, resulting from the miasma consequent on the heaps of snow, has already made its appearance in one or two quarters of the town, and the municipal council ought at once to take energetic measures to destroy the nests of malaria.

Shall we in London escape a similar infliction? We should, at any rate, be prepared to meet it.

IRRIGATION WORKS IN FRANCE.

NOTWITHSTANDING the exceptionally rigorous winter in France, and the anxiety felt in agricultural districts where things are for the moment at a standstill, the French, with that practical part of their temperament which contrasts strongly with their lighter qualities, are already turning their attention to the improvement of the soil, and utilising still more the many sources of wealth it contains, and are getting more than ever anxious to avoid the necessity for large importations of grain, by fully cultivating their land, which they know is capable of yielding yet larger harvests than those necessary for home consumption, and which would become a source of wealth. No matter what the form of government, any project of this kind generally finds prompt support, and, with a view to the more extensive irrigation of France, the Parliament has just passed a Bill declaring the construction of the Canal derivative of the Rhône to be a measure of public utility. The plan is due to M. Aristide Dumont, engineer-in-chief of roads and bridges.

The canal is destined to water a portion of the valley of the Rhône, and to combat by submersion the ravages of the phylloxera in the departments of the Drôme, of the Vaucluse, the Gard, the Hérault, and the Aube. It would also serve for the distribution of water in the towns, villages, and hamlets it traversed, and for hydraulic purposes. It will take its starting-point a little above the Roches de Condrieu, on the left bank near the Vienne, and will end in the suburb of Beziers; thus travelling over 457 kilomètres, with a total incline of 24 centimètres per kilomètre. At Mornas it will clear, by the aid of a syphon bridge, the valley of the Rhône, and debouch on the right bank. On the two flanks of the valley of the Rhône, and on the littoral of the Mediterranean, the canal, by its principal branch and its deviations, will dominate a surface of 220,000 hectares of vineyards that can be submerged.

M. Dumont presented his project some years since to the National Assembly, and in his report M. de Larcy showed, under an economical and fiscal point of view, the great advantages of the submersion of such an extent of territory. These 80,000 hectares of vineyards brought in more than sixty millions (of francs) a year to the population of these parts, as well as twenty millions to the Treasury, without counting the amount of the various town dues. The wines of these countries sold cheaply, and served for the consumption of the working classes, and no doubt the loss of the vines has been seriously felt. These riches can be recovered, it is shown, by the construction of the canal.

The general and municipal Councils of the valley of the Rhône have welcomed with enthusiasm this project, and all along the line syndical associations have been organised amongst the proprietors most interested, to settle in accordance with the law of the 21st of June, 1865, the extent of their subscriptions. On a previous occasion energetic opposition was manifested against the canal as taking away a large volume of water from the Rhône to the injury of the navigation of the river. Researches since made prove that these fears were exaggerated. However, the law has reduced from 60 cubic mètres to 35 cubic mètres a second the volume of water to be taken from the Rhône.

Furthermore, a Bill has been laid before the Chamber of Deputies to obtain power to carry as far as L'Ourège the canal of Pierrelatte. This canal, ceded in 1693, to the Prince de Conti, has never been finished. The expenses would amount to eight million francs. The State would grant a subvention of two millions, and guarantee for the interest.

We must not forget to mention that five irrigation competitions have been organised for this year, and prizes will be awarded in the departments of the Loire, Basses Pyrenées, Pyrenées Orientales, Haute Savoie, and the Vosges, to the agricultural proprietors, farmers, &c., who shall have utilised in the most profitable manner the waters that can be used for irrigation.

THE PARKES MUSEUM OF HYGIENE.

LECTURES TO WORKING MEN.

ON Saturday last Professor Corfield delivered the first of a series of lectures to working men on the uses of sanitary appliances, and on good and bad workmanship in plumbing and other trades. The lectures have been arranged for (with the sanction of the committee of the Museum) by the council of the Working Men's Club and Institute Union; but owing, we believe, to some other meeting in connexion with the Union being held last Saturday, the attendance in the Museum at University College, Gower-street, was very small.* The lectures are to be given on alternate Saturdays at three p.m. The second lecture will be given on Saturday, the 17th inst.

Professor Corfield, in commencing his peripatetic lecture, directed attention to stone-ware pipes for sewers and house-drains, or, as he preferred to call them, "house-sewers," for, he said, "drains" is an improper name for them if they are, as they should be, made of material impervious to water. "Drain"-pipes were, properly speaking, pipes made of permeable material, and laid in the ground in order to carry off subsoil water. Sewers, on the other hand, should be made of non-porous and, therefore, of non-absorbent material, such as glazed stoneware, for their primary function was to act as channels for the rapid and cleanly removal of house refuse without contaminating the soil in which they were laid, and, at the same time, without causing the accumulation within them of noisome deposits likely to evolve deadly gases. The jointing of stoneware pipes was a matter of very great importance. A very common and, at the same time, a very bad joint was that formed by a luting of clay. Clay was a bad material for luting the joints, because the fluid sewage after a time was apt to wash away the clay, and the fluid, making its way into the soil at the leaky joints, saturated the earth with noxious matter, and left the solid matters to accumulate in the pipes until a total stoppage took place. Those who used clay for luting the joints attempted to justify the practice by asserting that in the case of any settlement of the ground in which the pipes were laid the clay joints would yield without becoming leaky or causing the breakage of the pipes. He, however, contended that where there was the least chance of settlement, the pipes should be laid upon a bed of concrete, and this should be strongly insisted upon whenever house sewers were carried through made ground. Portland cement was a better material for joints, in so far as, when the work was properly done, it made watertight joints; but cement joints were troublesome to make, and there was a certain amount of danger that in making the joints some portion of the cement would be deposited inside the bottom of the pipe, and this, becoming hard, would offer a permanent obstruction to the cleanly flow of the sewage. Cement joints, too, made it a very difficult matter to remove a pipe for examination or for any other purpose. Undoubtedly the best drain-pipe joint yet introduced was Stanford's patent, the slight extra cost of which was, he should say, quite compensated for by the perfection of the joint and the rapidity with which it was effected. In Jennings's patent drain-pipes, the pipes themselves were perfectly straight cylinders of glazed stoneware, without the customary lip or socket at one end. They were of the usual length, and jointing was effected by means of short double sockets, about 6 in. long. Each end of these short pieces had a socket or lip into which the ends of the straight pipes were made to fit, one of the double socket-pieces, in fact, connecting two straight lengths of pipe together. These double socket-pieces had the further advantage of being made in two separate sections, the division being horizontal, so that the lower section could be fixed first, and the pipes at either end of it jointed to it with cement in a thoroughly cleanly and perfect way, while the upper section, forming a sort of semicircular or saddle-back cap or cover, could be jointed in mortar, and so be easily removable in case access to the pipes was required. This arrangement had great advantages for facilitating the examination of the drains, the removal of obstructions, or the junction of smaller and subsidiary lines of pipe. Having briefly expatiated on the merits of the various syphon-traps and gullies exhibited in the Museum, the Professor directed the attention of his audience to the evils of bad plumbing, as exemplified by the remarkable collection of specimens of D-traps, soil-pipes, &c., got together, we believe, by Mr. Eassie. Each of these numerous specimens is associated with some outbreak of deadly disease. Some of the specimens exemplify in a marked degree defective principles of sanitation, although the workmanship, as mere handiwork of the plumber, is good enough. This is notably the case in such specimens as the half-octopus-like D-traps into which in some cases four or five waste-pipes have been conducted. Professor Corfield strongly deprecated the use of lead D-traps, which, he said, were nothing but depositories of filth, and to connect these receptacles with over-flow and waste-pipes from cisterns, sinks, and baths was simply to lay on to our houses a deadly supply of sewer gas. Other of the specimens, such as several of the seamed soil-pipe joints and the D-trap made in sheet zinc, afford striking illustrations of what to avoid in anything worthy of the name of plumbing. Seamed soil-pipes, it was pointed out, appeared to be particularly susceptible to the corrosive action of sewer-gas near the seams; probably the sewer-gas had a greater affinity for the solder than for the lead. For this reason, Professor Corfield advocated the use of drawn-lead soil-pipes in conjunction with cast-lead syphon-traps. He insisted on the importance of cutting off all direct communication between the house drain or "sewer" and the public sewer, and urged that the house-sewer itself, as well as the soil-pipe, should be thoroughly ventilated throughout. As to water-closets, he strongly condemned the large iron containers of the old-fashioned pan-closets.

* It may here be mentioned that the Museum is open free on Tuesdays, Thursdays, and Saturdays, from 10 till 2. We are informed that the average number of visitors on each day the museum is open is about thirty.

Islington Proprietary School Site.—When this school was built (now about fifty years ago) it was in the then best part of the parish. The houses all around were private houses, and as a rule occupied by men of position and means, and the school was instituted to supply the apparently pressing want which then existed for a school in the neighbourhood where high-class education could be obtained. Since that time the neighbourhood has been greatly changed, and the school has been decreasing in numbers yearly. According to the *City Press*, the directors, finding that the fees received from tuition no longer sufficed to pay the staff of high-class masters engaged, and that there was no present prospect either of obtaining a good site elsewhere, or of an increase of scholars coming to the school in its present situation, have determined to accept an eligible offer for the site which was made to them a few months ago.

ARCHÆOLOGICAL DISCOVERIES NEAR MARSEILLES.

To the north-east of the department of the Bouches du Rhône a group of picturesque rocks and mountains, named the Montagnes du Vernegues, are well known to the more experienced and adventurous archæologists of France. The sides of these hills conceal innumerable mementoes of a bygone civilisation. Here may be found one of the best specimens of Greco-Roman architecture existing in France. It is a beautiful temple known as the Maison Basse. Close by there are some splendid mosaics, and many fragments of Samian pottery, with graceful arabesques. Towards the summit of these mountains may be found a great number of ancient sepulchres; but these have been emptied of their human remains long ago, and, consequently, offer but slight interest to the tourist. Fortunately, tombs still containing mortal remains have just been discovered. Under a light tumulus of earth and stones, built with some symmetry, three large sarcophagi have been found. These are of sandstone, and were covered with lids that are now broken. A small child's tomb was laid across at the head of the stone coffins which were placed in a single line running from east to west. The bones were still in a good condition, but mixed, and one coffin contained two bodies.

The soundness of the teeth suggested persons who were adults, but it was difficult to conjecture either their sex or nationalities. Probably they were not Christians, for their arms were not crossed. A coin was picked up close at hand, which at first, it was thought, would give some clue, but it turned out to be one of the counterfeit coins which the Lords of Vernegues so skilfully made in olden times, much to their personal benefit and to the confusion of the State. The development of the frontal bone of one of the skeletons, its large protuberances, the rectitude of the facial angle, suggest that it belonged to a member of the Latin Gallican race. This, if confirmed, might dispel the general belief that the tombs of Vernegues belonged to the Moors, who for a long time overran this country.

THEATRE BURNING.

A correspondent from Danzig writes,—Mr. Fölsch tells me that his list already includes twenty-four theatres totally destroyed by fire n 1879.

He proposes a little later on printing the list of theatres destroyed since the publication of his work on "Theaterbrände" (which you reviewed), with some remarks on recent experiences.

In reading the "Letters of Dickens," I find, in a letter dated 26th of September, 1858, speaking of Sunderland, he writes,—"The room in which we acted, converted into a theatre afterwards, was burnt to the ground a year or two ago."

As this case is not included in Mr. Fölsch's list of 523 theatres destroyed by fire up to 1878, perhaps one of your readers could supply the particulars as to

1. Exact date.
2. Hour of breaking out.
3. During a performance.
4. Any lives lost.
5. Any damage done to neighbouring buildings.
6. Cause of fire.

All Hallows New Church, Orange-street, Southwark.—The workmen employed upon this new building (to the number of about forty) were entertained on New Year's Eve at dinner at the clergy-house, Nelson-square, S.E., by the popular vicar of the district, the Rev. G. W. Berkeley, M.A. After dinner the healths of Mr. George Gilbert Scott, F.S.A., the architect, Mr. Edward Deacon, the managing clerk of the works, Mr. Harry Hems, the contractor, and especially of the kindly host, the vicar, were drunk with much enthusiasm. The evening wound up with a theatrical entertainment given by members of the church choir. The building is designed to accommodate 1,200 worshippers. An uncommon feature in the general arrangement is the position of the clergy and choir vestries, which although level with the nave floor-line, are immediately under that of the sanctuary.

THE NEW MUSEUM, GOTHA.

THE "Friedenstein Collections" at Gotha, so called after the place where they have rested for centuries, the castle of that name of the Dukes of Gotha built during the Thirty Years' War, are not unknown in art circles. The Thuringian capital owes not a little of its power of attraction to those collections, giving it a decided advantage over many cities of the same size in Central Germany. But their place of preservation, which, of course, was never intended to serve as a museum, did not admit of proper use being made of them. In 1844, Duke Ernst II. of Saxe-Coburg-Gotha succeeded to the government,—a prince well known for the generous encouragement he extended to the arts in all their branches. He soon came to the resolution to supply the want which was an obstacle to the natural purpose of the art-treasures in existence; but it was not until 1864 that the foundation-stone for a more suitable building for the collections could be laid, and only in the year that has just passed, 1879, could it be thrown open for public use.

The museum buildings were designed by Oberbaurath Neumann, a Vienna architect. As the accompanying illustration shows, they consist of a ground-floor and two upper stories. They are erected in the Renaissance style, and are flanked by four corner turrets, a cupola rising in the centre from the ground-floor. The principal front has a colonnade-porch with a loggia over it, and is decorated at the top with allegorical groups.

More attention has been paid to the interior arrangement of the museum than to its outward appearance. The full influx of light especially is in no wise interfered with. Ground-story and first floor have only side lights; the second story has side light for a part of its space, but four large rooms receive their light from above. It is owing to this circumstance that the collections may now be seen to better advantage, so that even those who have inspected them in their former abode seem to find new objects for observation, while such works as they are already familiar with appear to display new beauties.

The Friedenstein Collections are some of the most valuable which a long succession of art-loving princes have accumulated. According to their old division, they include the Art Cabinet, with the Chinese Cabinet, the Picture Gallery, with the Collection of Copper-plate Engravings, the Natural History Museum, and the Collection of Casts. The Cabinet of Coins and the Library remain in the castle of Friedenstein, below which, in a pretty landscape, the new museum has been erected. The catalogue published ten years ago of the Art Cabinet contains, in the section of "Collection of Antiquities," 2,287 numbers; in the section of "Mixed Art Collection," 2,508 numbers. At the same time, the Picture Gallery, in eleven sections, contained 755 paintings; the Collection of Engravings, nearly 50,000 plates; and the Collection of Casts, 238 groups, statues, busts, and reliefs.

Since then all the collections have received additions; more especially has the reigning Duke presented to the picture-gallery valuable works from his private collections of Gotha and Coburg. They have been distributed over the building in such a manner that, in the first place, the collection of paintings fills the four large rooms with skylights of the second story. It is rich, especially in Dutch paintings, containing, besides specimens of Rembrandt, Rubens, and Vandyck, works of Hals, Van Goyen, Wynants, Cuyp, Dow, Mieris, Ostade, Steen, Le Ducq, and others. Of German masters of the sixteenth, seventeenth, and eighteenth centuries, those represented at Gotha are Lucas Cranach, with twelve paintings, Elsheimer, Denner, Hackert, Tischbein, and Graff. Of Italians, there are, amongst others, works by Michelangelo, Palma Vecchio, and Guido Reni. On the walls of thirteen smaller rooms, surrounding the larger galleries, we find also the works of more modern painters of eminence. In those smaller galleries are also placed the Cabinet of Engravings, and the Art Cabinets, the latter containing Egyptian, Greek, Roman, and Germanic antiquities, among them antique terracottas, *objets de luxe*, vessels of gold, silver, and mother-of-pearl (mostly from the sixteenth and seventeenth centuries), ivory, and amber, *bijoux* of all descriptions, precious stones, middle-age *plastiques* in wood, ivory, and metal, embroideries, Indian, Turkish, African, and American weapons, articles of dress, and implements; and, finally, a very numerous collection, containing Chinese and Japanese porcelain, embroideries, and weapons.

The Natural History Collection fills the ground-floor, and contains numerous skeletons of antediluvian animals, foreign beasts of prey, rare birds, conchylia (17,500 objects), beetles, and butterflies, some of them splendid specimens. The collection of German insects is unique.

As mentioned above, the Library and the Cabinet of Coins have not been transferred to the new building. The Library contains 200,000 volumes and nearly 7,000 manuscripts, half of the latter being Oriental MSS. The Cabinet of Coins is one of the most remarkable collections in existence, comprising together nearly 70,000 Greek and Roman coins, bracteates, medals, and thalers. The Library and Cabinet of Coins being part of the Friedenstein Collections, they are separated from the contents of the new museum only by a distance of 200 paces. To merge the two collections into a whole, which they always formed, also externally, a grand staircase leading from the museum to Schloss Friedenstein, for an imposing execution of which all conditions are provided, will be constructed.

THE NEW GRANGE, PIRTON, HERTS.

PIRTON GRANGE, the residence of Mr. Hanscombe, is one of the few old moated houses still remaining, and has been occupied by direct descent in the same family since the time of Queen Elizabeth.

The new house, the subject of the illustration, is erected on a gentle knoll overlooking the present Grange, and with very extensive views to the east and south-west. The principal rooms are grouped round the inner hall and staircase, which are spacious and lofty; the main wall of the staircase and the garden entrance demarcating the family rooms and offices. The kitchen, store-rooms, pantries, &c., are grouped in contiguity to the service-lobby to the dining-room. On the first floor are six bedrooms, two dressing-rooms, day-nursery, with large oriel commanding an extensive view; bath-room, linen-room, heated by the hot-water circulation, &c.; and above are nine good attics, with lumber-rooms. Cellars and larder are provided in the basement. The joiners' work generally is in pitch-pine and red deal, with panels of "Roberts's fir," stained by a special process and varnished. The mantelpieces in the principal rooms are in American walnut, combined with various marbles; those on the first floor are in deal (for applied and painted decoration), with slips of black enamelled slate. The walls generally are built with the Arlesey perforated brick, and faced with local red brick; the window dressings, strings, &c., being of blue-grey Corsham, with moulded red and white bricks from Cossey and Braintree in the cornices, all laid in selenitic prepared mortar; the roofs are covered with Broseley tiles, with red ridges from Maidenhead. The execution of the tower is deferred for the present.

The general contractor is Mr. Twelvetrees, of Biggleswade; the mantel-pieces, ceiling, and other decorations are by Messrs. G. Jackson & Sons; the grates by Messrs. Steel & Garland; the hot-water work, baths, ranges, and pumps, by Messrs. Rosser & Russell; the pneumatic bells by Mr. Zimdars; the tile pavings by Messrs. Simpsons; the locks, &c., by Messrs. Hobbs; and the special adaptations of old furniture by Messrs. Cooper & Holt. The progress of the works has been facilitated and the building dried by the use of Ligny's patent drying apparatus by Messrs. Dreyfus & Co.

In the rear are a range of stabling, &c., with walled kitchen gardens, orchard, houses, and soon, the stable fittings being by Messrs. Musgrave, and the paving by Messrs. Wilkinson, of Newcastle.

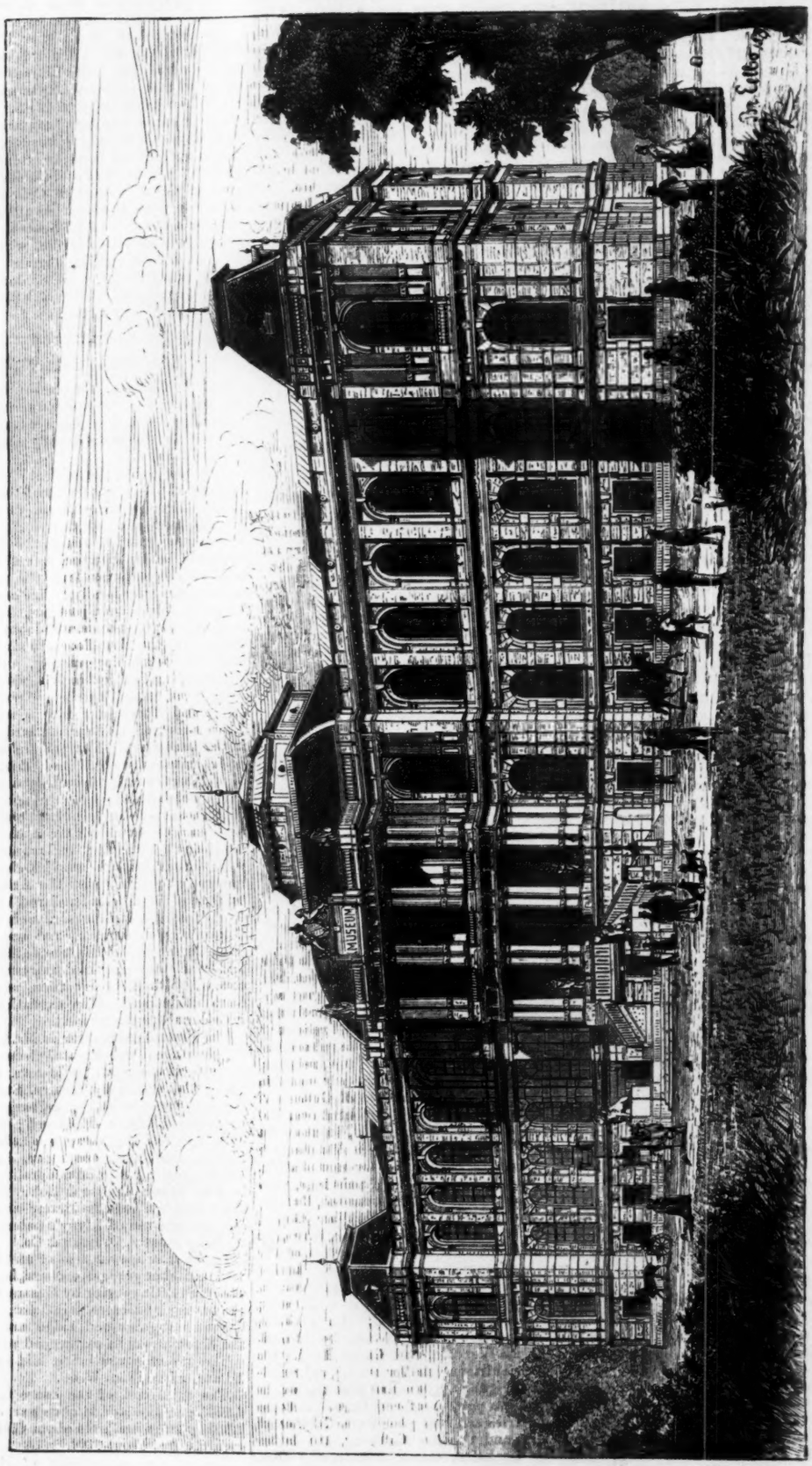
Entrance-gates and lodge are also built in the Hitchin road to correspond with the house.

The grounds are being laid out by Mr. E. Milner, of Dulwich Wood.

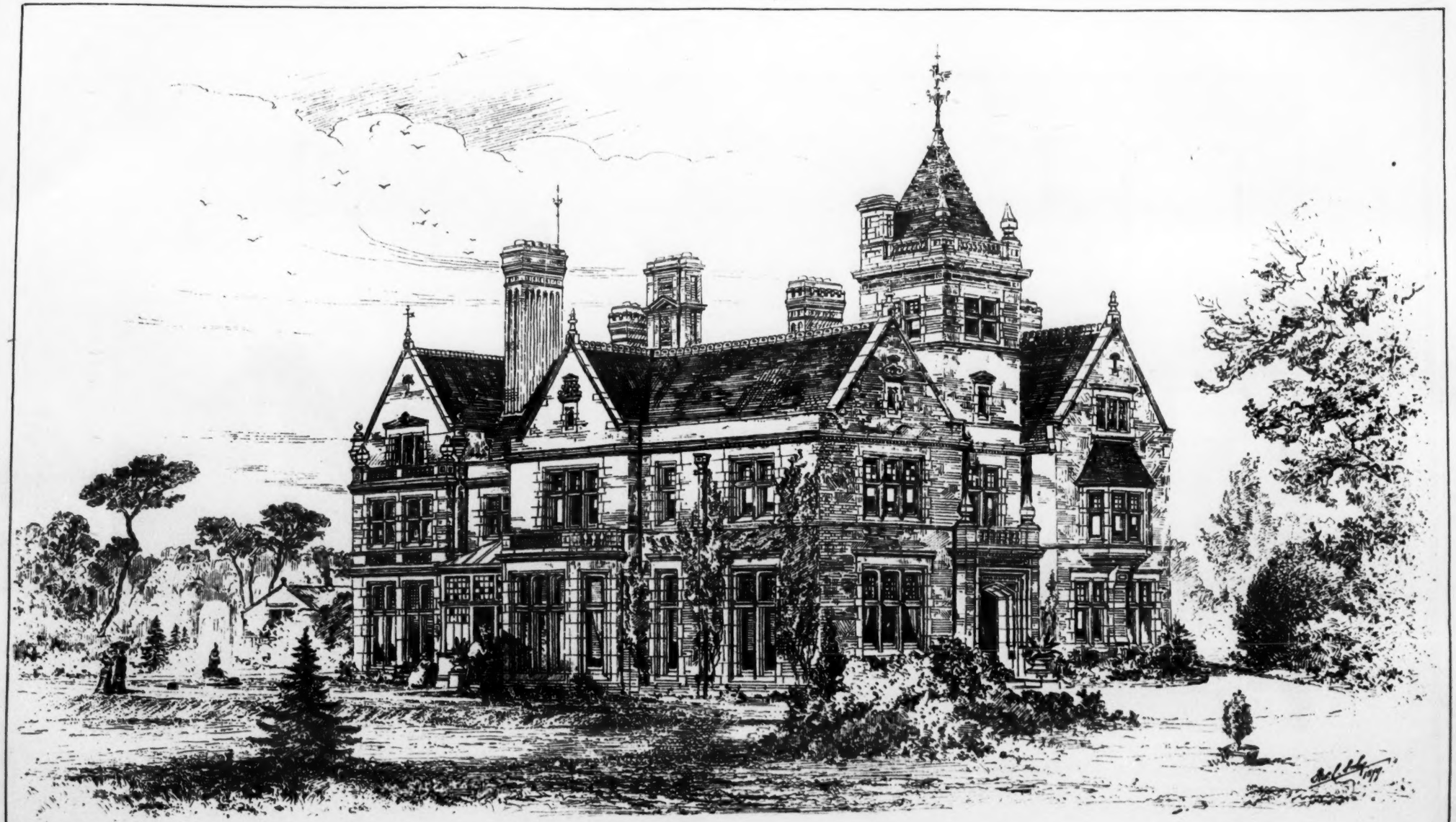
The total cost of the house is to be about 6,200*l.*; stables and kitchen gardens, &c., about 2,000*l.*; lodge and gate about 650*l.*; laying out grounds, &c., about 700*l.*

The general supervision of the works has been carefully performed by Mr. V. Trubshawe, under the direction of the architect, Mr. T. C. Sorby.

Viollet-le-Duc.—There is some talk of exhib ting the works of Viollet-le-Duc, in which case the exposition would take place in one of the empty rooms of the Cluny Museum.

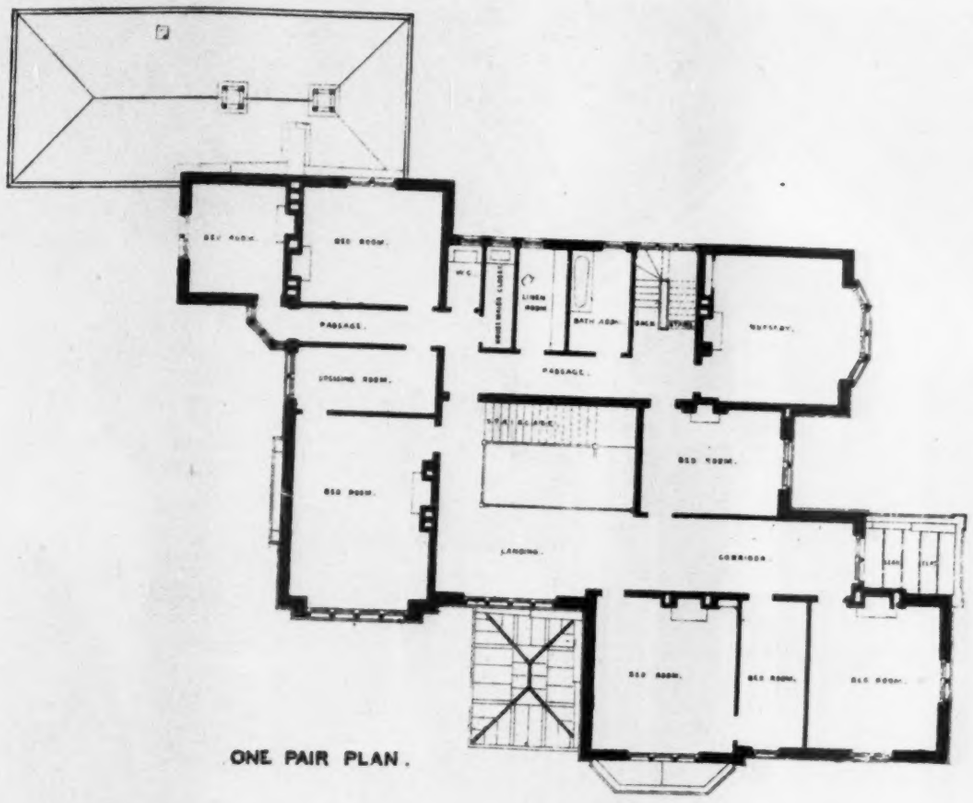


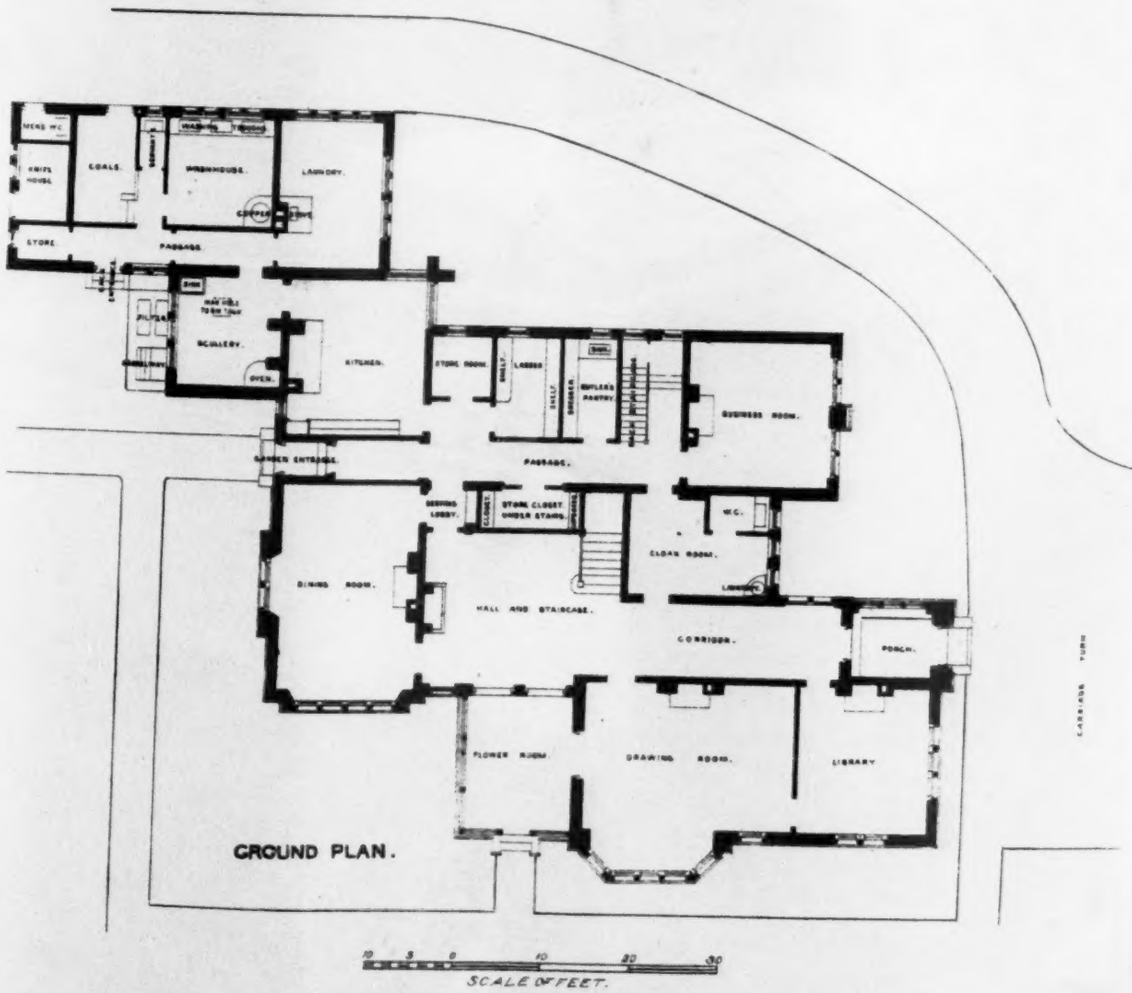
THE NEW MUSEUM, GOTHA, GERMANY.—OBERBAURATH NEUMANN, VIENNA, ARCHITECT.



THE NEW GRANGE, PIRTON, HERTS.—MR. THOMAS C. SORBY, ARCHITECT.

F. Lafargue Photo. Litho.

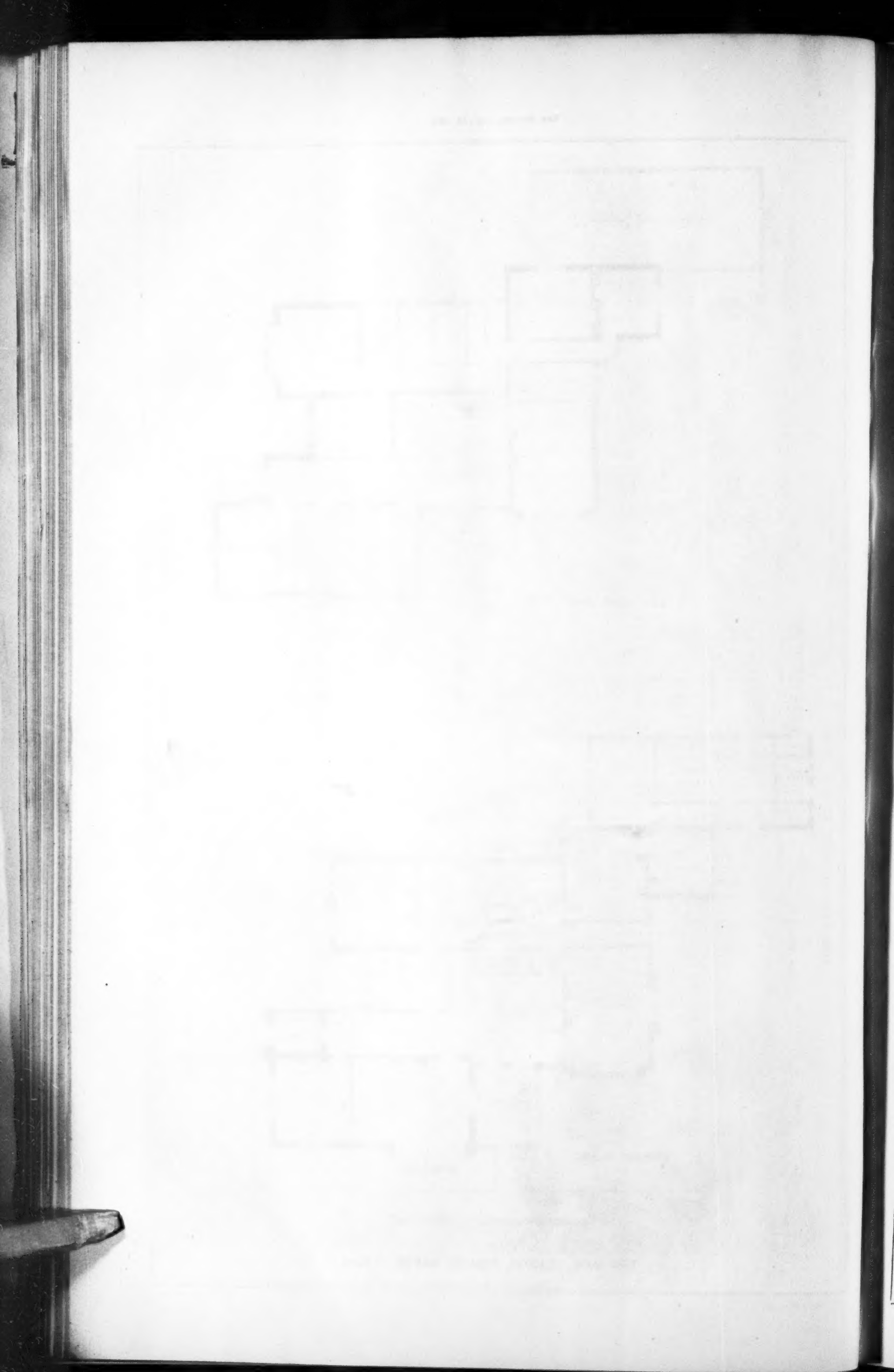


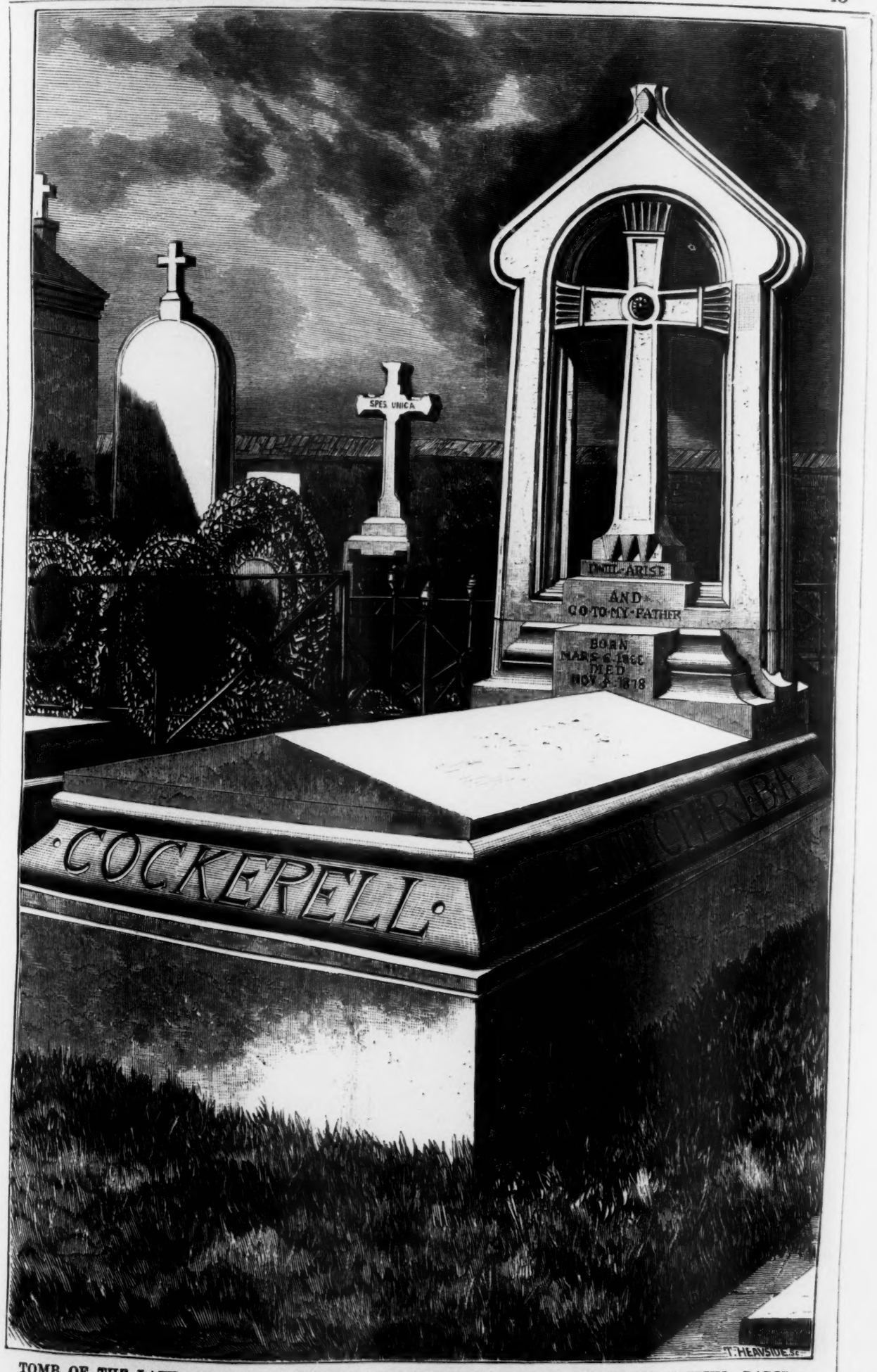


THE NEW GRANGE, PIRTON, HERTS.—*Plans.*

P. Lafargue Photo-lithe.

Printed by Wyman & Sons.





TOMB OF THE LATE MR. F. P. COCKERELL, ARCHITECT, IN THE CEMETERY OF AUTEUIL, PARIS.
FROM HIS OWN DESIGN.

THE TOMB OF MR. F. P. COCKERELL, ARCHITECT.

THE lamented death of Mr. F. P. Cockerell took place, as our readers know, in Paris, and he was buried in the cemetery at Auteuil, with many marks of respect. Some little time previously a monument had been set up in Algiers, from a design by Mr. Cockerell, for Mrs. Villiers Lister. This had been executed in Paris, it being easier to send it thence to Algiers. All the working drawings, therefore, were in Paris, and it was determined to adopt his own design for his own grave. We have engraved a view of it as completed in *pierre de Lorraine* under the direction of M. Pellechet.

We have lately repeated so many warm expressions of regard and regret on the part of Mr. Cockerell's friends and colleagues that anything more at this moment would be out of place.

THE PROPORTION OF INLET AND OUTLET SHAFTS IN VENTILATION.*

THAT is the question you ask me to answer. It might surprise some of you if I were to say that in the best-ventilated buildings we provide no special inlet openings for the fresh air; and yet this statement would be comparatively true, as in a large number of the most satisfactorily warmed and ventilated buildings erected within the last few years, we have not put in a single register or built flues expressly for that purpose. Now this change of practice is by no means the result of carelessness, or for the sake of economy, or because we know no better; for no one has urged more persistently than myself in years past the necessity for a large and special supply of fresh air to every inhabited room. In former years I provided supply-registers one-third larger than the exhaust-register for every room, and I insisted that both must be very large; but the frequent annoyance from unpleasant draughts was one of the difficulties constantly encountered. Some thirty years ago a gentleman in Philadelphia asked me to warm and ventilate his house in the very best manner. It was one of those rare occasions where the limit of price was not fixed; full liberty was given to do as we pleased. It was an ordinary city dwelling, first-class for Philadelphia, but not as large as the present New York house. But they had a good-sized yard which at that time pleased me very much, as I thought we should need most of it for building our fresh-air shafts and exhaust shafts. The fresh-air shaft which we built in the yard and carried clear above the tops of the four-story houses, was 3 ft. 6 in. in the clear, giving an area of a little over 12 square feet. The exhaust shaft, built close by, and carried to the tops of the houses, was 3 ft. square, giving 9 square feet of area. Now the warming of that great volume of fresh air was the next important problem to solve. For this purpose we took possession of that amiable man's cellar for about six months, and filled it with all sorts of contrivances for warming, tempering, moistening, and cooling the air, and when we were done, we thought we had accomplished a very wonderful thing, for which all mankind would be under everlasting obligations to us. We thought it very necessary to secure these valuable ideas by patents in America, England, and France. Fortunately the proprietor was sufficiently well pleased to pay the bills cheerfully. But the ladies were not sufficiently interested in mechanical and sanitary science to appreciate these splendid arrangements. I found they still preferred the old-fashioned open fire in the library, and would not say that they felt much better and more comfortable in the rooms heated and ventilated so splendidly by this new hot-water apparatus. This annoyed me. Not discouraged, however, at this, I persevered, and followed a similar course for years, filling the cellars of buildings that I had charge of with air-warming contrivances and the walls or yards with flues. I then attributed that universal complaint against hot air to ignorance. I thought it was because they knew no better. But the continued protest of all well-educated and intelligent people against the warmed air from the best heating apparatus that I could make so discouraged me that I was finally compelled to consider the reason for this universal complaint. Careful and impartial observation convinced me that I felt better myself in a room warmed by an open wood fire than in any room warmed by the most elaborate hot water air-warming apparatus that I could devise. Meeting soon after with a record of experiments tried for the purpose of ascertaining the effect upon the blood of inhaling air at different temperatures, I was surprised to notice the wonderful difference in effect between the inhalation of cold and warm air. It was stated that there was double the amount of carbonic acid exhaled when breathing air near zero that there was when inhaling air near the temperature of the blood. This, to me, was a wonderful revelation. It began to dawn on me why it was that I could not make people like that lovely warm air from my splendid patent hot-water apparatus. The air from that was generally about 100°. It was just lukewarm. It was neither hot nor cold. It had very much the sickening, debilitating effect of drinking lukewarm water. This was a sad discovery to me; it vitiated all our valuable patents, and destroyed all, or much, of the business credit I had been working so hard to gain for fifteen years. Tyndall's splendid experiment, tried about that time, showing that radiant heat passed through pure air without warming it, greatly interested me. This indicated Nature's method for distributing warmth by another process than that of warming the air. It explained clearly how the body might be abundantly warmed by direct radiation, and, at the same time, be surrounded by cold air which gives that invigorating effect in the external atmosphere of a clear, bright, sunny morning. It was very clear that this was the principle that gave the charm to the open fire. But the open fire had the great disadvantage of roasting one side of the body while the other was freezing. It also created a cold draught on the floor. But it remains, even to-day, as an undisputed fact which no one attempts to deny, that the open fire is the most wholesome and invigorating system of warming that we can have. Now, taking this as a basis, we want to see how we can supplement or substitute something that shall have nearly the effect without the disadvantages and inconveniences experienced in the exclusive use of the open fire. Burning coal has a temperature estimated at 2,000° or upwards. This high temperature has undoubtedly a very stimulating effect upon the body, and is exceedingly valuable for that purpose. In this respect we cannot substitute a lower temperature with the same advantage. But a well-diffused warmth over a large room is also a great advantage which the open fire does not give. This diffusion of the warmth is more readily obtained by steam than by any other agent with which we are at present familiar. Circulating hot water has the advantage of giving a lower temperature for mild weather, but the greater sluggishness of its circulation is a disadvantage that more than counterbalances any advantage gained by its milder temperature. What I now consider the perfection of warming (and its control of the ventilation I will speak of presently) is the mild diffused warmth of the materials composing the sides and floor of the room. The temperature of these should be just sufficiently in excess of that required in the room to counteract the cooling effect of the external atmosphere upon the walls and windows. A temperature of 90° or 100° is probably not too much for the floor, as this would be so nearly the temperature of the blood it would scarcely feel warm or cold. A temperature slightly in excess of this is desirable for the walls. With this positive warmth of the materials of the room, the air circulating around the room may be much cooler. With the floors and walls, at the temperature above mentioned, there may be a free circulation of the air at a temperature of 55°, without creating unpleasant draughts.

Now we come to the effect of this heating by radiation upon the relative size of the inlet openings and outlet openings for ventilation. The warmth not being contained in the air, but retained in the solid materials of the room, is not carried about with the circulating air. It warms the persons in the room in a steady, uniform way by direct radiation, which is not influenced by the whirling and circulating of the air. Three-fourths of that whole vexing question of ventilation is solved by this method of distributing the warmth. No amount of nice adjustment of the relative size of inlet openings and outlet openings can ever make a room satisfactorily warmed and ventilated while the warmth is produced by overheating the air. It is unnatural and physiologically incorrect, and we should have to get up a class of beings to order, and made on an entirely new principle, before we could get them to enjoy a room with cold floors and cold walls and filled with hot air. They should never be allowed to go out of doors into the natural atmosphere, as this would vitiate their taste. They should have suction-feet like the flies, so that they could walk on the ceiling, as there is where the heat accumulates in our furnace-heated rooms, and we ought always to keep our feet hotter than our heads. But in heating by radiation we can more nearly imitate the natural conditions with which we are surrounded; and the present race of human beings appears to be constructed upon principles to harmonise with those universal external conditions. Although heating by radiation greatly simplifies the ventilation, and renders it possible to produce satisfactory results, which warming by hot air never can, there still remains much to exercise the ingenuity upon in adjusting the heating apparatus, so as to give the most uniform temperature over the whole room, and to secure at all times the abundant supply of fresh air desired without draughts. Where the floor is 98°, and the air above it is 55°, this excessive warmth of the floor creates the most perfect agitation of the air over its whole surface by the air which comes in immediate contact with the floor being warmed, and rising, and the colder air falling to take its place. This is Nature's great method of ventilation. The earth is warmed by the direct radiation from the sun, and warming the air in immediate contact, creating the splendid natural ventilation which we so much enjoy. No stagnation of the air can ever occur under these conditions. By the system of diffused radiation much less inconvenience is experienced by the natural opening and closing of windows and doors, and a general circulation is secured in this way. With warmed floors and direct radiation, openings may always be provided at the ceilings for the escape of the vitiated air. These may be very large and allow of the rapid escape of the vitiated air, because the heat, being principally confined in the solid objects of the room, is not carried off by the escaping foul air. An excellent arrangement is to place the radiator under the window. This arrangement has many important advantages: it places the excess of heat immediately beneath the excess of cold, as the window is usually the coldest part of the room; again, it gives the simplest and most natural opportunity for supplying the fresh air. Great care must be used, however, in preventing the fresh air coming in contact with and being warmed by the radiator before it is inhaled by the living being. We have experimented much upon this. We at first brought the air in contact with the radiator before introducing it into the room, but this still supplied warm air for breathing, and we found it very objectionable. We are now very careful to deflect the inflowing fresh air upwards, and throw it first to the ceiling and allow it to fall gently and well diffused over the room. By this method the largest possible supply of fresh air may be introduced with the smallest possible inconvenience. There are other important advantages in this position for the radiator. If neatly fitted and properly adjusted it takes up the least valuable place in the room. It also avoids soiling the wall by the increased circulation of the air, which is so disagreeable where the radiator or register is placed against the solid wall. It is in this connexion that we find the best answer to your question as to the relative size of the inlet openings and outlet openings for ventilation. No fixed and definite supply of fresh air, or fixed inlet for the admission of the fresh air, can be made satisfactory under all the varying conditions and requirements of the human system, and the great range of temperature and ever-varying force and direction of the wind. An easily-regulated and nicely-adjusted supply is absolutely essential. And what can be more natural or simple for this purpose than the opening and closing of the windows? In addition to this, the halls should always be pure, and well supplied with pure fresh air. And these, then, become the great internal fresh air supply-shafts; and the hall doors, or the transoms over them, become other fresh-air suppliers to the rooms. There are still other cases in large halls where an additional supply of fresh air from the ceiling may become desirable, but never from the floor. But in all these cases a simple method of adjustment and

* Read before the Thirteenth Annual Convention of the American Institute of Architects, held in New York, November 19th, by Mr. Lewis W. Leeds.

regulation is absolutely necessary. No engineer can give definite proportions for the sizes of the inlet and outlet of this vital element in a building yet to be created, any more than a parent can fix the daily food and drink of his unborn child from infancy to old age. There are, of course, an infinite variety of details which may profitably employ the architect and engineer of ventilating and warming. But the one grand overruling subject, which must first be definitely settled, and should be settled intelligently, is,—Will the American architect be justified in preparing his plans for, and continuing to recommend, that system of hot-air currents which has been so thoroughly tried, and so fully and universally condemned? I say the *American* architect, because it is the architects of America who to-day are initiating the greatest reforms, and who will soon be admitted the world over to be the leaders in the introduction of all the valuable contrivances for securing the greatest health and comfort of the inmates of our buildings. Through the carelessness, or the ignorance, or whatever else we must call it, of the architect, millions of dollars are being spent in this country annually upon these air-warming contrivances, worse than wasted, because it saps the very foundation of the health of our people. And we still see this vicious system persisted in. Our court-houses, our asylums, our capitol buildings, club-houses, and such buildings as have large sums of money to spend for this laudable purpose, seem to be the easy prey for ignorant and ambitious engineers, who make a fascinating display of their magnificent machinery, put to the base use of attempting to counteract the great natural laws of creation. A report to the English Houses of Parliament by a committee appointed to examine and report upon the ventilation and warming of the public buildings of the kingdom, after making a full examination of these magnificent schemes for the forced supply of the fresh and warmed air, admits that they are entire failures; and, after excusing the expenditure of the enormous sums, upon the ground of experimenting in a laudable cause, says that every additional pound spent in that direction is an unjustifiable waste of money. Almost every committee appointed to examine the large institutions of this country, where machinery is used for forcing in warmed air, reports that nine-tenths of such machines have been abandoned or are standing idle. And now that modern investigation has proved so clearly that the whole system of air-warming is radically wrong, it does seem quite time that the American Institute of Architects should make their emphatic protest against its continued use. Last week, being in Washington, I stepped into the House of Representatives for a few moments and found the usual annual re-modelling of the heating apparatus going on. After spending 30,000 dols. last year on this work, they found it just as unsatisfactory as ever. They still persisted in driving in the detestable warm air, and now what are they doing? Simply tearing up the whole place, and making new registers double the size to get twice as much of the miserable stuff. They seem to think the relative proportion of the inlet registers and outlet registers needs changing, and they have been doing this almost annually for the last twenty years, and with the same uniform unsatisfactory results. And they might go on changing the relative proportions in all the infinite variety that could be figured out by the most learned mathematicians from now till doomsday, and the result would still be unsatisfactory, unless they changed the principle of warming. They have, to be sure, introduced two large mantel-pieces, with two very small fireplaces. This, of course, should be hailed with joy, as the dawn of a little common sense. But the long delay of allowing the full daylight of common sense, at least in this particular, to enter that hall, seems to me, at least, unfortunate. They have not as yet arrived at any more satisfactory results in Europe than we have here. In England they have used the Englishman's privilege of grumbling and finding fault with almost everything that has been done in this line, but they have not yet found any substitute to use in their large buildings that has proved satisfactory. In the Houses of Parliament they have brought the air-warming principle to as great perfection as it is capable of, and with the amount of radiation introduced in various portions of the building grumbling is reduced to moderate proportions. The great ventilating-shafts do excellent work, but their fans stand idle. All the other methods of warming having proved so unsatisfactory to the English, they still cling to the open fire. This is almost universally used. The new buildings for the British Museum are heated by immense stacks of hot-water pipes in the cellar, the water being heated by steam. The South Kensington Museum is heated by stacks of pipes under the passage-ways, with open gratings over them. Many of the large buildings in London, and through England, are heated in this way; there is much objection to it, however. The whole effect of the radiation in the room is lost by the heating-surface being placed below the floor in such a manner that the whole of the radiation is confined to a very narrow channel and thrown directly towards the ceiling instead of towards the floor. The channels are great dirt-collectors; the heating surfaces, being generally well coated with dust, give off unpleasant odours when heated. In France they have tried some very elaborate experiments, but mostly with air-warming arrangements. At the Grand Opera House very liberal arrangements were made for the heating and ventilation, the air being warmed in the cellar by upright drums, filled with hot water, heated by steam. The supply of fresh air and exhaust of foul are very liberal, but the entire absence of direct radiation causes intolerable draughts when the whole force of the ventilating apparatus is applied, consequently these arrangements are practically closed, and I never met an American who could remain during the whole performance with any comfort. They have also given much attention to the ventilation and warming of the hospitals. The new hospital Hôtel Dieu has a very elaborate apparatus for forcing in the warmed air. The theory of this forced ventilation is that it is independent of the external atmosphere,—that the internal pressure is sufficient to create an outward pressure at all times; but the experiments we tried there with the fans in full blast fully illustrated the fallacy of this theory. By opening any of the windows either on the windward or on the leeward side the air rushed in with great force, clearly showing that the force of the fans did not overcome the pressure of the external atmosphere. The practical difficulty thus created is that instead of working in harmony with the natural movements of the air, this forced ventilation opposes it, and tends to create stagnation, or, as sometimes may occur where great force is used in driving in the air without sufficient outlet, a very oppressive condition of the atmosphere. These annoyances vanish wonderfully when we learn to separate the heating entirely from the ventilation. Attend carefully to the proper placing and distribution of the heat; we can place some dependence upon that as a staid controllable thing. But the air we had better let whirl and gambol about to its heart's content, for that is just the nature of the thing. It affords me peculiar gratification to be able to present these views so fully before the society, for I consider there is no other body of men in the world that can exercise a more direct influence in bringing about the true and genuine reforms needed in this branch of building. There has been much discussion upon this subject of later years, and the intimate connexion it has with our health and with our daily and hourly comfort, and, in fact, with our very existence, warrants this attention. I know that men of experience and intelligence differ with me in some of the views expressed here, and many of you will doubtless hesitate to accept some of the ideas advanced until you examine them more fully. But I feel so fully convinced in my own mind of their correctness that I take the liberty of presenting just what I consider to be the exact truth and the facts, although they may differ from our present practice and our preconceived notions, hoping that with the brilliant future that seems so cheerfully dawning on this land, we may soon learn to build for ourselves dwellings that shall shelter us from the inclemency of the weather, and counteract the ever-changing temperatures, and at the same time preserve all the purity, freshness, and invigorating effect of the external atmosphere.

A Situation.—An open competitive examination for one situation as assistant-superintendent of furniture in the office of her Majesty's Works will be commenced, in London, on Tuesday, the 10th of February. The salary is 130*l.* a year, rising by 5*l.* yearly to 160*l.*, together with an allowance in lieu of apartments. The conditions are doubtless obtainable at her Majesty's Office of Works, Whitehall.

THE EXAMINATION OF ASSOCIATES OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A REPLY FROM A PROFESSIONAL PEN.

SIR,—The letter on the above subject signed "R.," which appeared in your number of the 27th of December, is a challenge to discussion. I hope you will permit me, as a strong advocate of the course which the Institute proposes to pursue, to take up the gauntlet thus thrown down.

It appears that in several respects your correspondent has fallen into error; if so, no wonder that his conclusions are mistaken. First and chiefly, an erroneous assumption underlies the whole letter, namely, that there is no desire to alter the existing state of things, and that it is the duty of the Institute to secure as many members as it can, and then do the best it can for them under existing circumstances. If this were so the examination would be unnecessary and undesirable. The truth is that those whose opinions I share feel that there is great and urgent need of improvement, and that it is more important for all the members of the Institute to be good men, and for all the good men to be its members, than that every one of all sorts should be swept into its net.

Secondly, though "R." is quite correct when he states that there is nothing to prevent a man's designing a house for another without belonging to the Institute, yet he is very much mistaken if he supposes and wishes your readers to infer that the designing of buildings is the sole work of an architect, or is that part of his work to which an examination would be chiefly directed. Still, I think, there would be an advantage if one of the general public could feel some security that when he saw F. or A. R.I.B.A. after an architect's name, the gentleman using that list of initials could be relied on as possessing an accurate knowledge of the important features and details of some one architectural style, and some acquaintance with the received mode of handling those details.

Architectural practice involves the safety of life and limb in buildings, both public and private. It involves such security from sanitary risks of various kinds as science has put within our reach. Persons who are risking their entire future in buildings for commercial purposes have to rely upon their architects' guidance to keep them from disaster. Tradesmen and firms whose entire capital and means of living are locked up in the building business, have no means of obtaining contracts for work except under conditions which place them entirely and almost without appeal in the hands of the architect, whose certificate is a condition precedent to their being paid anything.

Is it not desirable that the arrangements of the Institute should be such as to guarantee that none of its members shall assume the very grave responsibilities which these duties imply without having given the same sort of proof of their competent personal acquaintance with the business part and the scientific part of the profession which the law requires of the man who draws a lease, and *mutatis mutandis*, of the man who draws a tooth?

"R." is also very much mistaken when he supposes that the competence or incompetence of an architect can be judged by the gentlemen who happen to be present at the meeting when his name is up for election, and who vote upon it chiefly perhaps on the strength of the sponsors whom he has been able to secure, and with the knowledge that if anything against him were either known or suspected his name would not be put up. This, of course, is a valuable safeguard, but it is not a test of personal attainment.

The distinction drawn by "R." between the Institute and any corporation entitled to confer a diploma, is a just one. It is heartily to be wished that the day had come when no certificate for payment could be legally issued by any architect who had not previously obtained a diploma to practise. The time, however, is not yet ripe for that, and surely the next best thing is to establish such an examination of candidates for admission to the Institute, that membership may be equivalent to a certificate of competence to deal with the scientific and the practical side of an architect's work; just as much as the position of district-surveyor implies a certificate of competence to administer the Building Act.

I hope I shall not be thought uncharitable if I add that I am quite sure such an examination is needed. Many men commence practice

without having their attention directed in any way to the existence of difficulties which every architect ought to be prepared to grapple with; and then, if one of these difficulties happens to present itself early in their career, they are taken unawares, and great trouble is the result. Instances of this sort come to my knowledge from time to time, and I am sure that those of your readers who have the largest practices in architecture,—professional witnesses, and professional advisers of their brethren,—will be the best able to corroborate what I say. Unless I am mistaken, such men will tell you that a building dispute rarely comes under their notice in which, if the architect had been thoroughly aware of what was the best thing to do, and had done it, the greater part of the evil might not have been avoided. If this is true, it proves that many men obtain practice before they are fully prepared for it, and that it would be of equal advantage to themselves and to the public if their deficiencies were pointed out to them at a stage of their career when the remedy was easily within reach. T. ROGER SMITH.

INDEXING AS REGARDS ARCHITECTURAL BOOKS AND ILLUSTRATIONS.

ARCHITECTURAL ASSOCIATION.

AT the ordinary fortnightly meeting of this Association on Friday evening, the 2nd inst., Mr. S. Flint Clarkson, president, in the chair, the following new members were elected, viz.: Messrs. C. F. M. Cheverley, H. Budd, W. Williams, W. F. Croot, R. Bentley, Ll. S. Hammack, T. De Courcy Meade, C. D. Backshell, W. R. Low, P. Dollar, W. H. Oakley, G. Pinkerton, J. W. Simpson, L. V. Hunt, F. L. Borgeaud, C. R. Bailey, S. J. Wolfe, C. F. Anderson, H. C. Clarke, A. Sykes, E. J. Reid, R. F. Hodges, A. E. Gannaway, J. H. Pentland, J. B. Pinchbeck, R. C. Murray, J. Higgins, F. O. Stephens, W. T. Lowdell, H. S. Hicks, R. E. Smith, J. C. P. Higgs, A. B. Durlacher, F. A. Gearish, and C. F. Clifton.

The President having made an appeal to the older members of the Association to act, to a certain extent, as recruiting-agents for the various classes, in order to maintain to the utmost the usefulness of the Association,

Mr. Page announced that the following requisition had been received by the secretaries, viz.:—

"*To the Honorary Secretaries of the Architectural Association.*

GENTLEMEN,—We shall be glad if you will call a special business meeting at the earliest opportunity to consider the following addition to Rule I., which we, the undersigned, herewith beg to propose,—

To add after the words, 'the Architectural Association,' the words, 'and the society is intended to be established under the authority and for the purposes (so far as applicable) of the Literary and Scientific Institutions Act, 1854.'

ALFRED CONDER, GILBERT R. REDGRAVE, H. G. TURNER, JOHN SULMAN, L. A. SHUFFREY, R. E. POWNALL, JOHN JOHNSON, JAMES SMITH, THOMAS GARRETT, T. C. YATES, R. L. COX."

Mr. Page said that in accordance with that requisition, the committee had fixed the special meeting to be held at seven o'clock on the evening of the 16th inst., preceding the ordinary meeting to be held on that date. The alteration in the rule had become necessary because the Association, wishing to take a lease of the second-floor, had been informed by the lawyers that, as at present constituted, it had no legal standing.

Mr. R. L. Cox then read a paper on the above subject. Having given a very interesting sketch of the literary aspect of the question, he said,—

The work already done in this direction is so extensive that it becomes necessary to have an index of indexes, and to obtain this, as well as to further the making of others, a society called the Index Society was founded in 1878, which has already issued a number of valuable publications, including a list of such works. The clever essay by the secretary, Mr. Wheatley, would amply repay any one for the trouble of reading it. He seems to have consulted every authority, and to have so thoroughly exhausted the subject, as to leave little for any one else to do without repeating what he has already said. Our profession is much behindhand, however, in this work. The Institute has no index of its Transactions; we do not even publish ours. Other students have classified our books for us, but I do not believe that it is generally known amongst us where their lists are to be obtained. Yet the number of writers on architecture and building is only about 380,—a small total compared with the 1,300 of fine arts, the 5,000 of poetry, or the 12,829 of divinity; and the trouble, therefore, of reducing their works to the classified order of a subject-index would not be so very alarming. But that is a work that would have to be considered apart from the index to the journals.

Now as to the practical part of the subject. How is an index to be made that will tell one at a glance what has already been published, and where it may be found? We require a work of easy reference, compiled on a simple system, and without the introduction of any signs, abbreviations, or intricate plan of arrangement that must be known familiarly before the work can be used at all, the object in view being, as Mr. Cutter, the librarian of the Boston Athenæum, says, threefold.

First.—To enable a person to find a book or print of which (*a*) the author, (*b*) the title, or (*c*) the subject, are known. Second.—To show what there is published (*d*) by a given author, (*e*) on a given subject, or (*f*) in a given style or kind of literature. Third.—To assist the choice of a book or print.

This could be accomplished by the systematic noting by readers of all remarkable essays or illustrations, with a view to their ultimate arrangement and classification. But to do this properly great care and attention would have to be exercised by the readers, or ridiculous errors, like those referred to, might be the result. If well done, however, such an index, like that to Thomas Carlyle's "Essays," would be both interesting and useful to read by itself, particularly as a refresher after having once read the book; though, perhaps, the style might be in a manner like what the Frenchman found Dr. Johnson's "Dictionary," which he heard was a standard English work. He read it conscientiously through from beginning to end, and said, at the conclusion, that it was no doubt a charming English book, and full of information, but that it seemed to him somewhat disconnected!

I venture to propose a plan by which the greater part of the work of indexing by subjects, authors, places, or any other way, matter relating to our profession, could be got through in a comparatively short time. A committtee should be appointed to arrange and supervise. They should nominate readers of known ability, discretion, and care, each of whom should become responsible for a complete index of some one volume. In reading, the indexer would note down the contents on sheets of wide paper divided into eight columns. The first for the subject: whether an illustration of a building, an essay, or a report. The second for the name: either of the building, or of the essay, or report. The third for the place in which the building is situated, or to which the essay or report refers. The fourth for the town. The fifth for the county, if necessary. The sixth for the description: as in the case of an illustration, plan, detail, or perspective view; or, in the case of a paper, an indication of its nature. The seventh for the name of author or designer. The eighth for the reference. It might be necessary to have either more, or to alter what are here given; but that is a matter of detail for after consideration. The sheet, when filled, would look like this:—

Subject	Name	Place	Town	County	Description	Author	Reference

A line would be kept for every entry, and a cutting line ruled between each, and by filling up this form you would have enough information in one line to indicate what it is all about.

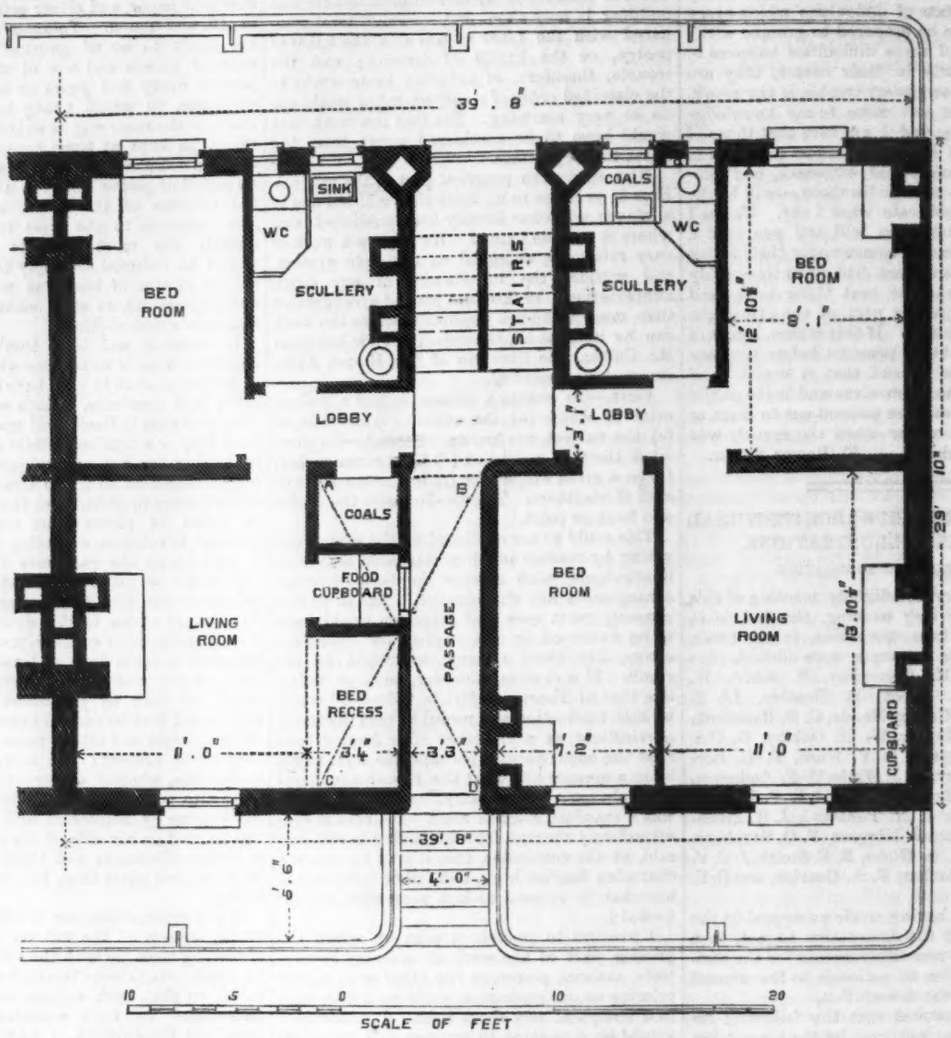
These eight columns might be multiplied or diminished at discretion. By one of the numerous copying processes now so easy to manipulate, and so cheap to obtain, eight copies could readily be made of each sheet, as soon as it was full. These being sent to the committee, would be cut into strips along the cutting line, and would furnish materials for as many indexes as may be desired,—that is of places, subjects, authors, journals, or anything else,—by the simple act of arranging the requisite columns in alphabetical order; or the duplicate slips could be exchanged with other committees for copies of the work that they had done. The strips, being arranged alphabetically, would be fixed to sheets of paper, and either printed from or kept in MS. and bound. Volumes of reference that are likely to be of general use, say one of authors' names and one of subjects, might be printed every five years or so; while the MS. catalogue, to which yearly additions could be made, in the same way as at the British Museum, might be kept at some central library, where any one could refer to it, so that there should be no period of pause between the appearance of the volumes of the index, whereby students lose reference to the most recent, and consequently the most valuable information. I should be inclined to apply this system to the subject matter of books, as well as to journals and illustrations, so as to make the index really a complete undertaking.

It certainly will be a troublesome question hereafter what is to be done when these volumes of reference shall in turn have increased to their fifties and hundreds. Each one being a complete alphabet in itself, will make, in process of time, fifty or a hundred letters to search through in looking for any one subject. It would be better, therefore, to try to arrange the sequence of the letters in printing, so that the books could be taken to pieces from time to time and rebound in volumes, according to letter, or even to subject, as the case may require. Such a plan would be materially aided by printing the indexes on one side of the paper only. Desirable though a plan of this description might be if carried out in its entirety, it would be Utopian to expect to see it done, at least for many years yet. In the meantime, however, a great deal might be done by publishers and authors if they would first be careful to make their indexes more accurate and rather more descriptive than they do at present; and next, if they would in all cases, whether of periodicals or of books, issue two copies, one to be incorporated with the volume as heretofore, and the other loose and printed on one side of the paper only, so as to enable librarians and those desiring to cut them out and paste them into large blank index-books.

It is a great assistance, in referring to periodicals, to keep all the indexes together instead of binding them up with the volumes,—a reason for publishers to issue two copies of the ordinary index, so that each volume may not be made incomplete by such omission. In keeping periodical illustrations, I have found it very useful to arrange them by themselves, apart from their respective journals, in three or four great classes, such as ecclesiastic, civil, domestic, and scholastic, each being subdivided into as many classes as possible. Thus, the civil will have town-halls in one portfolio, museums in another, libraries in a third, and so on; the drawings in each being again divided by paper covers into minuter details, so that you get all the plans together, all the elevations together, all perspective views together, or all drawings in sets together. Every portfolio and every wrapper is of course labelled outside, and a perfect plan would be no doubt to have pasted in the cover of the portfolio the contents cut from such an index as I have described. The trouble of looking for a drawing is here limited to that of turning over one subdivision of a portfolio; whereas, if they were bound up with the volumes, as no doubt they should be, you might take a week to find what you want. A general index, such as the one I have been urging, would admit of each volume being made perfect, while it would show at a glance where anything was to be found.

An interesting discussion ensued, the president, in support of the general thesis of Mr. Cox's paper, quoting Lord Malmesbury's saying, "Knowledge of reference is knowledge itself." The other speakers who took part in the discussion were Messrs. R. E. Pownall, G. R. Redgrave, John Johnson, H. W. Pratt, and — Smith; and a vote of thanks having been accorded to the reader of the paper, the meeting terminated with the announcement that on Friday, the 16th inst., Mr. Basil Champneys will read a paper on "Soul Bay and its Churches."

The Government and the London Water Supply.—The *Land Agents' Record* understands that Messrs. Smiths & Gore, land agents, of Whitehall-place, have been instructed by the Home Secretary, Mr. Cross, to make the necessary negotiations for the purchase, by the Government, of the rights and interests of the various London Water Companies, and that such negotiations are now proceeding.



A, B, C, D.—On the Upper Floors the Whole of this Area forms a Bedroom.

DWELLINGS OF THE INDUSTRIAL CLASSES, HOXTON.

IMPROVED DWELLINGS FOR ARTISANS.

IN your issue of the 20th of December, the plans and suggestions for an improved class of dwellings for artisans are not without considerable interest as a contribution to the problem of the best class of dwelling.

My connexion with the particular estate to which Mr. Judge alludes, though not in the capacity of architect or designer, would lead me to his conclusion, that it is possible to design a house far better fitted for its primary purpose, viz.,—to give house-room to a single family, and I doubt not the directors of the Artisans' Dwellings Company will welcome any practical suggestions to that end.

Before venturing to criticise in one or two points the design submitted, I should like, with an increasing experience in erecting such class of building, to state what it seems desirable to lay down as general principles, applicable to all such schemes.

1st. Isolation of each dwelling; that is, that it shall be self-contained, and that any arrangement giving common blocks of water-closets or lavatories off a public staircase is to be deprecated as destructive of the privacy of home.

2ndly. That all plans depending on balconies as a means of access to the dwellings have a double disadvantage; that the privacy of the sitting or bed rooms opening on such balcony is destroyed, and that you have darkened the rooms and made them less healthy.

3rdly. Any plan that compels the occupants to go through one room to gain access to another is evidently unfitted for dwellings where from hour to hour use must be made of the whole of them; and it is specially dangerous and undesirable in the case of illness in the dwelling.

4thly. Any plan involving many or dark passages or staircases on entering the dwelling or the rooms in the same is to be scrupulously avoided, as adding both labour and expense to the inmates in the endeavours to keep the same clean.

Now many of the later blocks of dwellings designed or carried out in the metropolis and elsewhere have these defects, and, difficult as it undoubtedly is to adapt any special type of plan to varying sites, I cannot but think that a self-contained house, with adequate ventilation by natural means through the same from front to back, with conveniences in direct access to the outer air, but not necessitating exposure to it, is the true idea for a workman's dwelling. To make my meaning clear, I have accompanied this with a ground-plan of part of a block of dwellings recently erected by me, where an endeavour has been made to cope with these points.

Mr. Judge addresses himself to the problem of a semi-suburban dwelling, where land is not of the same value as in the heart of the metropolis, and where the conditions are easier; but I almost fear his design lies open to some criticism. The living-room is placed in the rear and not the front of the house,—surely not a desirable plan for either cheerfulness or the appearance of the house; this living-room is a passage-room, giving access from the front to the back, and everything must be carried through it to the yard or scullery.

The scullery or washhouse, too, has a bedroom entered from it, which has obvious disadvantages on the ground of possible smell and sanitary dangers arising. The first-floor dwellings have one point in their planning which is shown alternatively; in the one case you go through a bedroom to gain access by a long flight of steps to a yard, and the conveniences therein; and in the other you diminish the width of your bedroom to gain a passage, thereby seriously lessening its usefulness, and making it inconveniently narrow. I fear that in many cases of sickness such external accesses only to the rear of the house would be found inconvenient and undesirable.

Whilst, therefore, I think that thanks are due to Mr. Judge for the idea, I think he will himself see that some material alterations in his designs are necessary, and I fail to see why the plan I now send, with a common entrance open to the air, back and front, might not meet the wants even of the semi-cottage dwellings to which he refers.

The whole subject has of late years advanced many stages. It is now clearly proved that good dwellings can be erected and made to pay a fair percentage sufficient to satisfy any reasonable capitalist.

The real difficulty that now exists is to find blocks of land at a reasonable ground-rent in neighbourhoods where it is essential for the artisan population to live.

The capital is forthcoming in large amounts, the elevating and humanising influence of improved dwellings is recognised by every intelligent man, and it has been possible to unite with these dwellings, in special cases, reading-rooms, coffee-houses, and the like, which serve to centre the interest of the dwellers in such homes.

It remains, I think, if possible, to throw more art feeling into the erection and design of such buildings; to prevent, where possible, going to an excessive height; and to induce large public corporations, instead of leasing out their land for the erection of third and fourth-rate houses by speculative builders of a low type, to develop

their buildings with their large resources, receiving as they will do a fair return.

The various associations, and specially those men who initiated the movement, have done noble work, and though it cannot be denied that the action of the Artisans' Dwellings Act has so far been rather injurious than the contrary, as the act of destruction has increased overcrowding, it is to be hoped that this may soon be remedied.

Still, I think a word of caution should be addressed to bodies of trustees, such as those of the Peabody Fund, that in letting the dwellings below the fair market rent, and in being contented with a very low rate of interest, they are doing a doubtful amount of good.

THOMAS CHATFEILD CLARKE.

MEETING OF ENGINEERS ON THE TAY BRIDGE DISASTER.

THE terrible accident at the Tay Bridge has already given rise to several varied theories as to the cause of the disaster, and doubtless others will follow. We understand that a private meeting of engineers was held on the subject on Saturday afternoon last, at the Cannon-street Hotel, at which Mr. E. W. Ives, C.E., amongst others, was present. Mr. Ives has for some time past been connected with the construction of several important engineering works, including the immense roof of the Lime-street Station at Liverpool, and the whole of the large bridges on the Central Railway station to Manchester. It appears that since 1862 he has given close attention to iron bridge construction, and last week, after the accident, he was induced to visit Dundee for the purpose of inspecting the ruins of the bridge, being present at the diving operations throughout the week. At the meeting on Saturday he made the following statement:—"I am of opinion that the wind had, previously to the train entering on the large span of the pier, obtained such a hold of the girders as to cause them to oscillate considerably; that the piers, not having proper bracing, rocked until the bolts parted on the weather or south-west side, and caused the whole structure to collapse and to be blown over. To properly investigate the matter of this fearful calamity, the whole of the girders, together with the engine, tender, and remaining carriages, should be bodily lifted, which could be easily done by means of large pontoons; but, as the girders are in lengths of nearly 1,000 ft., diving-bells should be used, so as to enable the iron to be cut through under water in convenient lengths."

THE DOUBLE-ACTION SOIL PIPE VENTILATOR.

SOME of our readers have asked us for a little further elucidation of the ventilating arrangements devised by Messrs. Robt. Boyle & Son, and described briefly in our last issue. We add, therefore, some diagrams. As we have already said, the upper portion of the ventilator consists of the air-pump or extracting ventilator, connected with the up-cast ventilating-pipe. The down-cast ventilator, forming the lower portion, communicates with the soil-pipe. From the arrangement of the plates or division, it represents an open mouth (on the principle of the wind-sail) to the wind, from whatever quarter it may blow, forcing it down the soil-pipe and up the ventilating-pipe. "By this means a double power is obtained, the force of the wind driven down, and the suction of the extracting ventilator, keeping the soil-pipe perfectly free from poisonous gases."

Both pipes may be placed inside the house or outside, as preferred; or the soil-pipe may be fixed inside, to protect it from frost in the winter time.

A 2-in. ventilating-pipe is introduced, connecting the drain with the up-cast pipe, where no provision is made for ventilating the drains separately.

Diagram 1 shows how Messrs. Boyle ventilate the w.-c. by means of one of their air-pump ventilators placed on the roof, with a main pipe led down the wall and connected by means of a branch pipe with the centre of the ceiling, the fresh air being admitted through a vertical tube placed against the wall close to the door, so that the current of air will always have a direction from the door to the ventilator, which, for obvious reasons, is the proper direction. The vertical tube is connected underneath the floor with an opening through the wall communicating with the external air.

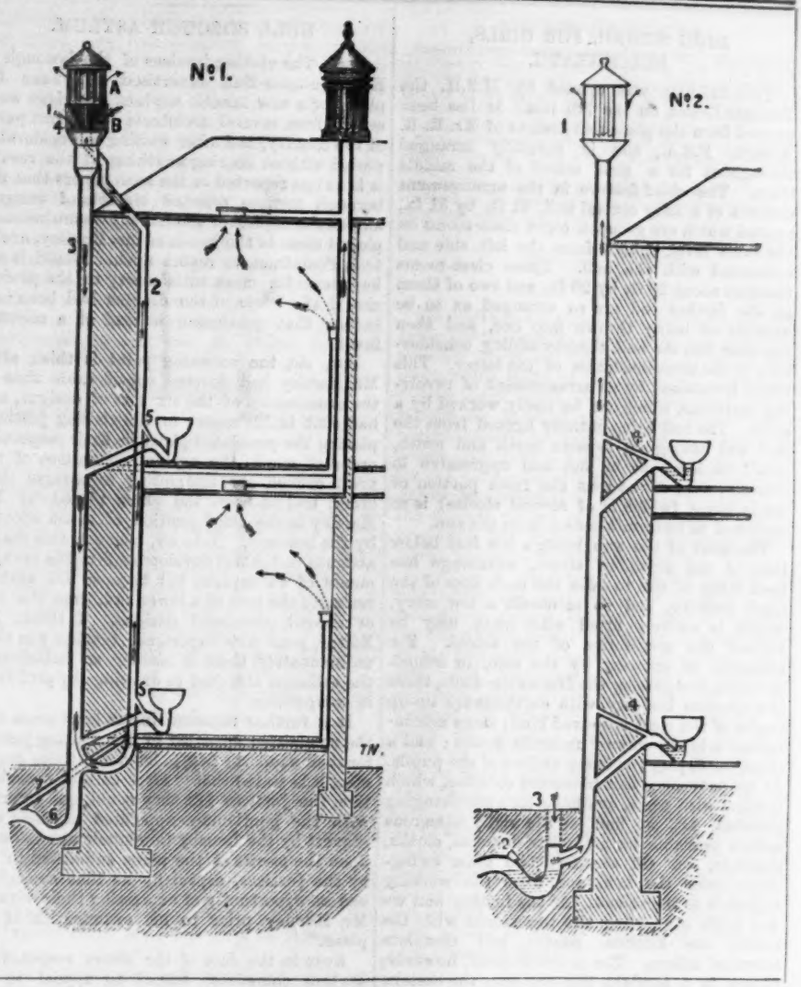


Diagram 2 shows the system of soil-pipe ventilation which is now extensively used. 1 is a Boyle's patent air-pump ventilator 10 in. diameter, for creating an up-draught and preventing down-draught. It is now well known to all in any way interested in these matters. 2 shows the drain-trap. 3. Fresh-air inlet to soil-pipe, by which means a thorough current is established. By the use of such appliances the health of the community would, without doubt, be considerably improved, and the death-rate reduced in proportion.

The ventilators are shown in the diagrams larger in proportion than they would be in reality, for the purpose of making their construction plain and more evident.

VENTILATION OF GAS-BURNERS.

SIR,—"W.G." states that the principal objection to the use of single pipes, conveying gas effluvia from a room, is their great heating-power, "the cure being found to be more intolerable than the evil sought to be remedied."

I am inclined to ask, How can this be? Can a pipe that withdraws a large proportion of hot air from an apartment yet raise its general temperature above that existing when the burners were unventilated?

If "W. G." were to contend that the radiated heat *immediately surrounding* this pipe must be greater than the diffused heat (which would occupy the same space if no such tube were in use) I can agree with him. But he implies that this, the simplest method of ventilating gas-burners, is apt to oppress inmates of a room with a sense of greater heat than the unventilated burners would produce.

My experience is quite opposed to this theory, and I think most people would, on consideration, dissent from his views.

However this may be, it is worth remarking that while the air extracted from the room by such a pipe is extremely unhealthy, that which is warmed by its surface must be comparatively pure.

The system, to which "W. G." refers, of surrounding the pipe with a non-conducting medium and an outer casing, is undoubtedly good, both as a means of subduing radiant heat, and for other reasons that can hardly be advanced within the limits of a letter. The great objection, however, with very many would be its unsightly proportions. I believe I am correct in stating that the firm of which I am a member first applied a complete system for discharging gas-fumes outside a building. This was done very many years ago at the Athenæum Club, and, though imperfect, is still in use. From that time to the present we have found the greatest objections to the tube-method of ventilation were raised on the score of its heavy and ungainly appearance.

We have studied much how best to qualify this defect, without impairing either ventilation or lighting-power, and a model of an improved fixture of this class has been for some months on view at the Parkes Museum of Hygiene, Gower-street. We are glad to find that the medical profession seem to appreciate such merits as it possesses.

H. FARADAY.

CHURCH BUILDING IN MANCHESTER.

THE *Manchester Diocesan Directory and Churchman's Almanack*, for 1880, shows the progress of church extension in this diocese. Since the formation of the diocese in 1848 to December 21st, 1869, 110 new churches were consecrated by Bishop Lee, providing 77,177 sittings, 39,568 of which are free. The cost of erection, exclusive of endowments and cost of sites, has been 451,344*l*. In many cases the addition of tower or other enlargement has greatly increased this outlay. Twenty new churches were built and consecrated in lieu of former churches, at a cost of 90,825*l*.

From Bishop Fraser's consecration, on the 25th of March, 1870, to the 19th of November, 1879, seventy-six new churches have been consecrated by him, providing 42,938 sittings, 34,611 of which are free. The cost of erection, exclusive of endowments and cost of sites, has been 511,129*l*. In many cases the additions of tower or other enlargement has greatly increased this outlay. Fourteen new churches, in lieu of former churches, have been built, at a cost of 168,000*l*.

HIGH SCHOOL FOR GIRLS, BLACKHEATH.

THIS building was opened by H.R.H. the Princess Louise on the 7th inst. It has been erected from the plans and designs of Mr. E. R. Robson, F.S.A., and is specially arranged throughout for a girls' school of the middle class. The chief feature in the arrangement consists of a lofty central hall, 61 ft. by 31 ft., around which are grouped eight class-rooms on the same level, lighted from the left side and connected with the hall. These class-rooms measure about 20 ft. by 20 ft., and two of them at the farther end are so arranged as to be capable of being thrown into one, and then together into the hall, thereby adding considerably to the accommodation of the latter. This result is obtained by an arrangement of revolving partitions, which can be easily worked by a child. The hall being entirely lighted from the roof, and having its aspects north and south, would be liable to be hot and oppressive in summer, were it not that the front portion of the building (which is of several stories) is so arranged as to form a screen from the sun.

The level of the site being a few feet below that of the adjoining street, advantage has been taken of this to raise the main floor of the front building, and so to obtain a low story, which is entirely fitted with what may be termed the accessories of the school. For example, on entering by the side, or school-entrance, and passing the first swing-doors, there is a spacious lavatory, with earthenware tip-up basins of the most approved kind; large accommodation in the way of umbrella-stands; and a stove, for drying the damp clothes of the pupils. As we pass along this basement corridor, which is fitted with seats, available for girls changing goloshes, &c., we find on the right numerous spaces available for umbrellas, bonnets, cloaks, goloshes, &c. On the left two glass swing-doors enter the hall, and form the working approach to the school. At the further end we find a lift connecting the top stories with the lower, the kitchen, pantry, and complete servants' offices. The corridor itself, however, passes in a straight line out into the eastern playground, where is a large, roomy, covered playground, fitted with swings, and from which the latrines are approached. In the centre of this playground a splendid tree has been carefully retained, and made to form the centre of a circular seat. On the north side of the open playground (which altogether contains an area of about half an acre) there are garden-terraces, which, in course of time, will be duly laid out and planted.

Returning to the building, we find the principal floor of the main structure, having a wide central entrance connected with the hall itself by a loggia of five arches, and a grand staircase constructed entirely of terra-cotta. From this we note at the opposite end of the hall a cast and pedestal of the world-renowned Venus of Milo, which has been presented by the architect. The rest of this floor is occupied by the head-teachers' rooms, those for the assistant-mistresses, music-practising rooms, drawing, &c. On the floor above are two class-rooms similar in size to those below, but lighted somewhat differently, and made to throw together by a glass sliding partition. The rooms for the caretaker and servants are on the second story.

A few words may not be out of place as to the sanitary precautions here observed.

Every school-room is fitted with Tobin's pipes, so contrived that there will always be an imperceptible change of air. For the hottest weather provision is made for through currents. Every lavatory, sink, and rain-water down-pipe discharges into the outer air over an open grating and trap, thus disconnecting the whole from any connexion with the main sewer. All water-closets inside the building are protected from all pressure of sewer gas by the soil-pipe being carried of its full diameter straight upwards through the roof.

The external architecture in the front shows a building of stock bricks with red edgings, depending for effect upon proportion rather than ornament, while a public character is imparted by the lofty stone portal and its carvings, executed by Mr. McCulloch.

The whole of the work has been executed by Messrs. Wall Bros., the contractors, at a cost of 5,500*l*.

Although the building is ostensibly only for 300 girls, it would in reality be available for a very much larger number.

HULL BOROUGH ASYLUM.

SIR,—The visiting justices of the borough of Kingston-upon-Hull advertised last June for plans for a new lunatic asylum. Designs were sent in from several architects in various parts of the country, and after waiting a considerable period without hearing anything of the result, it is at last reported in the local papers that the borough justices selected six sets of designs, and at the request of the Lunacy Commissioners placed them in the hands of Mr. Hartley, architect, Pontefract, to report upon. Would it not have been far more satisfactory to the profession if the *whole* of the designs had been laid before that gentleman instead of a selected few?

But, sir, the crowning point is this: after Mr. Hartley had devoted considerable time to the examination of the six sets of designs, and had sent in his report to the visiting justices, placing the premiated plans in their respective order of merit, the asylum committee of the town council are attempting to reverse their order, and to have the plans placed by Mr. Hartley in the third position of merit adopted by the borough. Not, sir, because this design abounds in faithful developments of the requirements of an asylum, but because the authors estimate the cost at a lower sum than the first or second premiated designs. I think, Mr. Editor, your wide experience teaches you that, unfortunately, there is nothing so fallacious as the estimate attached to drawings by architects in competition.

It is further reported in the local press that the committee appealed to the visiting justices for their support; but, in honour to those gentlemen, it is stated that "after careful consideration, the justices felt they could not interfere with the gentleman appointed at their own request by the Lunacy Commissioners to decide upon the merits of the plans submitted to him by the justices, especially as that committee had an opportunity of expressing their views to Mr. Hartley prior to his examination of the plans."

Even in the face of the above response the asylum committee intend to appeal to the Lunacy Commissioners for their sanction to this proposed outrage; but let it be hoped the advisers of this public office will cause a thorough investigation to be made into the whole circumstances of the case, and order a fresh inspection, not of a selected few sets of drawings, but upon *the whole* of the designs forwarded in competition.

Before concluding this letter, may I ask if it is true that a gentleman holding an important public appointment in the corporation of Hull is intimately related to one of the authors of the third premiated design, and which it is desired by that body to place in the first position?

F.R.I.B.A.

STAINES TOWN-HALL COMPETITION.

SIR,—When this competition was advertised, you were good enough to insert in your paper a letter of mine in which I drew attention to this subject generally, and to the terms upon which architects were invited to compete, in particular, and I expressed the hope that few, if any, would be found to enter the lists.

With your permission I will now draw attention to the mode in which the matter has been decided, and I do so in the hope that some practical outcome may be the result. About forty designs were submitted. Six of these were placed before an architect who was called in by the Board to assist them in making a selection. Before advising them, he stated that they could not expect to obtain a building such as they required under 4,000*l*. (this being 1,500*l*. more than the sum the competitors were told would be the limit of the sum expended). The Board acted upon the advice given, and also agreed to pay to the successful competitor 50*l*. in addition to the 100*l*., which, upon the terms of the agreement made with the competitors, he was to receive for the superintendence of the work. The Board thus threw to the winds their own instructions, and admitted their impracticability. When these facts are placed before your readers, they will, I think, consider that a more flagrant case of, to say the least, breach of faith has rarely been brought under their notice.

Now, sir, because a body of men act without due knowledge and consideration, and thus involve a number of architects in trouble and expense, for which they have not the possibility of a chance of ever being remunerated, are the latter to remain without redress, and be content with the fact that this body of men have made a laughing-stock of themselves? I trust that events will prove that this is not so. If it were once for all decided that promoters of competitions cannot play fast and loose with us in this way, a great move will have been made towards the fair conduct of competitions,—the accomplishment of which has been your untiring aim. This is a question I should like to see tried in one of our courts of law; and I trust the Institute may see their way to vote a sum towards obtaining thereon the opinion of some counsel of standing.

To assist in this I shall be happy to subscribe, should a number sufficient for the purpose deem the cause worthy of their doing likewise.

ESPRIT DE CORPS.

OBITUARY.

Mr. E. W. Cooke, R.A., F.R.S., died on Sunday last, at Glen-Andred, Groombridge, near Tunbridge-Wells, in the sixty-ninth year of his age. He was the son of the eminent engraver, George Cooke, and was born in London, in 1811. For a short time he studied architecture under the elder Pugin. Under the direction of his father he devoted his attention to engraving. His first efforts were illustrations to botanical works,—"Loudon's Encyclopædia," "Loddige's Botanical Cabinet," &c. His first publication was "Shipping and Craft," for which he drew and etched fifty plates; then drew and engraved twelve large plates of Old and New London Bridges, published in one volume; after which (about the year 1832) he took to painting. Mr. Cooke's first works were mainly coast and Dutch subjects, large rough sea and marine views (having visited Holland eighteen times, in 1845-6), about 100 pictures on the coast of Italy, from Marseilles to Pæstum, including Florence, Rome, &c. He was elected an A.R.A. in 1850, and R.A. in 1863, and in the same year a Fellow of the Royal Society. Mr. Cooke was also a member of several other learned societies.

Mr. C. A. Gould.—At a meeting of the Metropolitan Board of Works, on the 2nd inst., the Superintending Architect reported the death of Mr. C. A. Gould, District Surveyor for East Hackney (South) and North Bow. The gross income of the district was about 500*l*. a year. Mr. Gould was appointed in 1875. The Building Act Committee was instructed to consider as to the steps to be taken with a view to the filling up of the vacancy.

Herr Karl Geyling.—The Austrian papers announce the death of the painter on glass, Karl Geyling. His chief works are in St. Stephen's, Vienna.

Mr. John Robertson.—The death is announced of Mr. John Robertson, the portrait-painter, of Liverpool. Mr. Robertson, who was in his fifty-ninth year, was a Scotchman by birth, and went to Liverpool upwards of thirty years ago. In the course of his career he executed the portraits of some of the leading gentlemen of the town, including the late Mr. William Rathbone, the late Mr. James Aikin, and Mr. Stewart, the latter of which is now at the Town-hall. He also painted the portrait of Mr. J. A. Picton, which now hangs in the vestibule of the Walker Art Gallery, and that of Mr. George Holt in the Liverpool Institute. He was for many years treasurer of the Liverpool Academy.

Mr. G. E. Hering.—The death of Mr. George Edward Hering, landscape-painter, occurred on the 18th ult.; his age was seventy-four years.

Miss Mary Archer Shee, second and last surviving daughter of the late Sir Martin Archer Shee, president of the Royal Academy, died on the 30th ult., at Florence, after a few days' illness.

ABSORPTION OF WATER BY BRICKS.

IN answer to your correspondent's letter ("J. N.") in last week's *Builder*, I beg to inform him that I have recently tried some experiments as to the absorption of water by bricks, and with the following result:—

White kiln bricks (No. 1), immersed fourteen days, absorbed 1 lb. 4 oz.; ditto (No. 2), ditto, 1 lb. 1 oz.

Red kiln bricks from the Kent Brick and Tile Company (Plackley), immersed thirty-five days, absorbed ¾ lb.

Black vitrified brick from the same company, after an immersion of thirty-five days, had not absorbed anything.

Hard stock clamp-burnt brick (No. 1), immersed eighteen days, absorbed ¾ lb.; ditto (No. 2), ditto, 15 oz.

S. W. IRON.

Board of Works Offices, Whitechapel.

ST. PAUL'S CHURCH, BEDFORD.

THE chancel of this church has been nearly rebuilt, and the work is now complete. It has been carried out from the designs of Mr. G. Gilbert Scott, F.S.A., architect, and under the immediate personal superintendence of Mr. John Day, of Bedford, the diocesan surveyor. The style of work is Perpendicular. The old roof of the chancel has been raised, and a new clear-story built beneath. There are new arcades, new north aisle, choir vestry and organ-chamber, and a turret has been erected in the north-east corner of the transept and choir-vestry. The new east window is a large one of six lights. The chancel roof, of oak, has had all the varnish, &c., removed from its timbers. The doors are of oak, moulded on the face with vertical and horizontal boarding. Clipsham stone is used for all weatherings, sills, columns, springers, and battlements, whilst the window-jambs and tracery are of Ancaster. The roofs are, in accordance with the style, of low pitch, and covered with lead. The windows have been glazed with cathedral tinted glass by Mr. F. T. Odell, of Bath-street, City-road, London. The stone carving is by Mr. Harry Hems, of Exeter. The cost of the works just completed is about 3,000*l.* They have been carried out by Mr. Albert Kimberley, of Banbury. Messrs. Gillett & Bland, of Croydon, are fixing chimes at a cost of 300*l.* in the tower, which is a central one. This tower was newly built, and the old spire refixed over it, in 1868. For that work Mr. R. Palgrave, of Westminster, was the architect.

The chancel of the parish church of St. Paul's, Bedford, contains much that is interesting to the archæological, as well as to the architectural visitor. The fine ancient oak stalls, showing some nine curious old *miserere* seats and some quaint elbow-rests, are very similar in character and date to those at the collegiate church of St. Mary the Virgin at Higham Ferrers, in the neighbouring county of Northampton. They have been refixed, and so have many old brasses and monuments. These, where they have been moved, have been replaced *in situ*. Some of them are very fine specimens of the type of work popular in the early part of the seventeenth century. One is a memorial to Sir William Harpur, the founder of the great charities for which the town is so celebrated, and from which 14,000*l.* a year alone are spent upon education in Bedford. He is buried in this chancel, with his two wives, and his brass is also preserved in the south aisle. He was Lord Mayor of London in the year 1561, and died in 1573, aged seventy-seven. The east window it is intended to fill with stained glass, in memory of this benefactor to Bedford.

The old stone pulpit, a curious Perpendicular one, of octagonal shape, is of clunch stone. It is preserved in a corner of the south aisle, or archdeacon's court. A couple of singular loaf-boxes, like pigeon-holes, hang in the south chancel aisle; one is 3 ft. by 1 ft. 7 in., and contains holes 6 in. by 4½ in. by 4 in., for twelve small loaves. Thereon is painted, "XII loaves given weekly and 8 sermons yearly by Thomas Paradine, gent., 1606." The other measures 3 ft. by 9 in., and the openings are 6 in. by 7 in. by 8 in. respectively. It is for four larger loaves. It is inscribed, "The gift of Robt. Bamford, rect. of Little Barford." The sizes, 6 in. by 4½ in. by 4 in., and 6 in. by 7 in. by 8 in., seem to suggest that loaves, 300 years ago were made particularly small.

SURVEYORSHIP ITEMS.

Derby.—The election took place on the 30th ult., at a special meeting of the Council held for that purpose. The Committee recommended that the following four candidates should appear before the Council, and that the appointment should be made from those gentlemen, viz.:—Mr. Edward Buckham, aged 37, of Ipswich; Mr. Thomas Coulthurst, aged 40, Derby; Mr. T. Lloyd Edwards, aged 37, Aberdare; and Mr. William Oldman, aged 38, Durham. This recommendation having been adopted, the candidates appeared before the Council, one by one, and a ballot was afterwards taken, the result of the first voting being,—Buckham, 20; Coulthurst, 44; Edwards, 40; and Oldman, 7. It was then decided to strike out the two candidates who had received the lowest number of votes. The final voting resulted as follows:—Coulthurst, 34; Edwards, 23. Mr. Coulthurst was therefore the successful candidate. Mr. Coulthurst is an architect by profession, and has designed several of the schools erected by the Derby School Board. The appointment which has just been conferred upon him involves the sacrifice of all private practice.

Dudley.—Mr. W. H. Richards, the borough surveyor, died on the 30th ult. Mr. Richards, who was in his fifty-second year, received his appointment in March, 1867, and appears to have discharged his duties with every satisfaction to the Corporation and the inhabitants generally. The Town Council have authorised the Streets and Gas Committee and Public Works Committee to take steps for supplying the vacancy, and also empowering them to make arrangements with Mr. Walter Richards to fulfil the duties of the office *pro tem.*

WELBECK ABBEY: ARCHITECTURE UNDERGROUND.

SIR,—In your paper of the 3rd instant, describing the unique works in progress at Welbeck Abbey, the seat of the Duke of Portland, no mention is made of the means by which all the underground apartments, passages, and other constructions were rendered impervious to moisture. I accordingly solicit the favour of your noticing the fact that from 1869 to the past year a staff of this company's men was employed in encasing the whole in Pyrimont asphalte.

J. FARRELL, Sec.

Claridge's Patent Asphalte Co. (Limited)

TENDERING IN HAMMERSMITH.

SIR,—In your journal of the 20th of December last, the Board of Works for the Fulham District state that they will be prepared at their next meeting, 31st of December, 1879, at ten o'clock in the forenoon, to receive tenders for 1,643 ft. of 4 ft. by 2 ft. 9 in. brick sewer, to be laid down in Crown-road, Fulham, and that "plans and specifications," &c., might be seen at the Surveyor's office after the 24th of December, 1879.

Having lived many years in this district, and occasionally taking a part in local matters, I know something of the Fulham Board of Works and its *little ways*. So, on the 26th of December last I went to the Board's Offices, which I found closed, and would remain so until Monday, the 29th of December; I went on the 29th, at ten o'clock in the forenoon, and I believe that I was the first person to see the "drawings and specifications" publicly. I complained to Mr. Henry G. Bean (assistant surveyor, and son of the surveyor), of the short time left, viz., one clear day, to copy specification, trace drawings, and take out quantities, &c., and I asked him if the quantities *had been taken out*, and he admitted that his brother, Mr. Alfred J. Bean (not an officer of the Board) had *already supplied them*. I naturally asked why he should be allowed access to the drawings, &c., before the day announced for them to be seen by the general public. However, I got no satisfactory reply, but was informed "That no contractor need have the quantities unless he liked"; but, for some reason, *certain contractors do like*,—in fact, show great partiality for Mr. A. J. Bean's quantities,—and where is the prudent man who would refuse to take a copy of the quantities supplied by the surveyor's son, with the additional advantage (in the event of the tender being accepted) of doing the work under the immediate superintendence of a third son, viz., Mr. William Bean, clerk of works, and the supervision of several very active members of the Board, who are also pleased with little attentions paid to them? But stay! I had almost forgotten to mention that it was not until Tuesday, the 30th of December, and after the Board's offices were closed, before my assistant handed me a copy of the specifications, which I carefully perused, but nowhere could I find any reference to the kind of bricks to be used, but, on the contrary, the space where they should have been specified was left *blank!* So on the following morning, December 31, I applied to the Board to grant me an interview, which they did, the result being that I got the time for receiving tenders extended to the 14th of January, as your advertisement columns show.

In conclusion, permit me to refer to the list of tenders (see *Builder* October 4, 1879) for 2,650 ft. of 4 ft. by 2 ft. 3 in. brick sewer in Scrubs-lane, Hammersmith, for the Fulham Board:—

	Stock Bricks.	Gault Bricks.
Mears	£8,600	£8,975
Nowell & Robson	8,475	8,900
Keeble	8,150	8,500
Williams, Son, & Wallington	7,360	7,780
Hatton & Co.	4,650	—

The last tender was said to be informal on the ground that the price for gault bricks was not stated.

Messrs. Williams, Son, & Wallington's tender, which includes 500*l.*, was accepted, and, I have it on the best authority, are doing the work with stock bricks.

Now, sir, it so happens that the Metropolitan Board are carrying out a section of this sewer, viz., 2,080 ft. of 4 ft. by 2 ft. 6 in. brick sewer, the accepted tender, including 300*l.*, being 3,080*l.*! And I understand that the bricks used cost 3*l.* 3*s.* per 1,000. So that this already over-taxed district has to pay nearly 3*l.* per foot for their section of the sewer, whilst the much-abused Metropolitan Board can get their portion done for less than 30*s.* per foot!

Further comment is unnecessary from me, but the sooner a Parliamentary commission is appointed to inquire into the glories of local self-government the better for the oppressed and apathetic ratepayers.

ALEXANDER PILBEAM.

FIRE-PROOF FLOORS.

SIR,—If your correspondent "Fair Play" will refer to my letter of December 13th, he will see it is "the spring of 1876" I mention as the period I exhibited my concrete patents at the Royal Institute of British Architects (the late Sir Gilbert Scott was in the chair), and amongst them were the fireproof joist and floor I now advocate.

On the occasion he refers to, June, 1876, when diagrams copied from Mr. Hyatt's book were exhibited, you were in the chair.

He will therefore see the matters he charges me with taking from Mr. Hyatt's book were publicly exhibited by me a year before it was published.

W. H. LASCELLES.

LAND INCLOSURE.

Steventon.—An application for a provisional order for the inclosure of the common fields, the meadow lands, the cow common, the green, and other waste lands in the parish of Steventon, having been made to the Inclosure Commissioners for England and Wales, Mr. G. Pemberton Leach, an assistant Inclosure Commissioner, has held a public inquiry at Steventon for the purpose of hearing all persons interested, either as owners or in behalf of the public, in the subject matter of the application, and for receiving any information or evidence which might be offered in relation thereto.

Acomb.—A numerously attended meeting of ratepayers was held the other evening in the schoolroom, Acomb, for the purpose of considering the alleged illegal inclosures recently made by the lord of the manor in Front-street, Gale-lane, and Rufforth-road. After explanations had been given by Mr. James Wright and Mr. Thomlinson, surveyors of the highways, by whom the meeting had been called, Mr. Ellis, agent of the lord of the manor, said he had now no doubt that the Rufforth-road inclosure was illegal, but he had the authority of the surveyors at the time it was made. As to the Front-street inclosure, he was of opinion that it was an improvement, and that the lord of the manor had as much right to inclose as other people. After a long discussion, a resolution was passed, empowering the surveyors to take legal advice as to the best means of resisting such encroachments.

PROVINCIAL NEWS.

Birmingham.—The Birmingham Household Supply Association proposes to erect new stores, at a total cost of 20,000*l.* The site is in Corporation-street, and has a frontage of 28 yards, and an area of 1,000 square yards. The plans have been prepared by Messrs. Martin & Chamberlain.——It is proposed to erect a new central fire-brigade station, on a site in the Upper Priory, at a cost, including land, of 20,000*l.*

Bolton.—The ceremony of cutting the first sod, preparatory to the erection of a new convent or abbey, to be called Mount St. Joseph, and situated near Deane Church, Bolton, has taken place. The contractor for the basement portion of the institution is Mr. William Hampson, and the architect is Mr. J. J. Hurley, of Bolton.

Evesham.—The cottage hospital here has been formally opened by the Mayor. This building is designed after the model of the one at Tewkesbury, and provides accommodation for eight patients. All the walls of the wards, Board-room, stoves, operating-room, and corridors are cemented. Ventilation is effected by means of Sheringham's ventilators in the outer walls, fixed close to the ceilings, and air-flues in each chimney-stack, opening into the wards, and large ventilators over each door, so as to secure a free circulation of air. All the woodwork throughout (except kitchen and out-offices) is pitch pine, oiled and varnished. The corridor on the ground-floor is laid with Gibbs & Canning's tiles. The style is based on Queen Anne, the architect being Mr. George Hunt. The contractor was Mr. William Gardner, whose estimate amounted to 1,131*l.*

Folkestone.—At a special meeting of the Town Council on the 19th ult., plans were submitted for winter gardens, &c., which it is proposed to establish in the Lower Sandgate-road. The gardens will occupy between four and five acres of land, and will extend from the line to a point half-way up the cliff.

Rumoured New Coinage.—It is stated that the Queen has lately given sittings to Mr. Boehm, who is at work on a new die for medals and for the currency.

APPRENTICE SCHOOLS.

ON Monday evening last there was a large gathering of the students, teachers, and friends of the Artisans' Institute in Castle-street, St. Martin's-lane, when Mr. Samuel Morley, M.P., presided. The object of the meeting was partly to encourage the teachers and students in the work in which they were engaged, and partly to call the attention of employers and educationists to the nature of the experiment which is being made at this Institute. Its *raison d'être* may be described as the need of supplying technical training in handicrafts for workmen and apprentices in a form not hitherto furnished in this country. The supporters of the Institute claim for it that it provides a form of instruction not to be found either in the workshop or in the ordinary evening classes established in connexion with the science and Art Department of the Council of Education. On the one hand, it is generally recognised that, now-a-days, the apprentice receives no systematic training in the workshop; and, on the other hand, it is asserted that a large proportion of those who attend Science and Art classes do not understand how to apply to practice the scientific principles in which they are instructed. The Artisans' Institute seeks therefore to give instruction in theory and in actual work simultaneously, and to illustrate the one by the other. In order to accomplish these objects the services of skilled artisans have been secured, who have not only a practical knowledge, but have obtained certificates of proficiency in the various subjects connected with science and art, from the Science and Art Department. Great encouragement has been recently received in the prosecution of this experiment from the paper read before the Society of Arts by Professor S. Thompson, of University College, Bristol, who showed that the Apprentice Schools in Paris, Havre, and Besançon had for some years been doing precisely the work aimed at by the Institute, and with the most successful results. At the meeting on Monday night, testimony to the importance of the experiment was given by the following speakers, in addition to the chairman: Messrs. Hodgson Pratt (treasurer of the Institute), J. G. Fitch, H. Trueman Wood, E. J. Watherston, G. Shipton, O. Waterman, Alsager Hill, R. Newton, and two of the teachers, Messrs. B. Berry and C. T. Millis. Letters of regret at unavoidable absence had been received from Messrs. G. T. Bartley, Owen Roberts, H. Doulton the Rev. H. Solly, Geo. Godwin, and others.

Previously to the commencement of the meeting in the Hall, the company were conducted to the several class-rooms, where there was an exhibition of work done by the teachers, as also of models and works of art which had been lent for the evening.

The success of the gathering was enhanced by the musical services of several ladies and gentlemen, members of the Kyrle Society. Votes of thanks were given to Mr. Morley, Mr. Pratt, and especially to the teachers, viz., Mr. C. T. Millis (secretary), G. Berry, W. Wright, G. Jackson, H. L. Ramsey, and G. Wall, who conduct classes in geometry, drawing, modelling, and building construction, and afford practical instruction to metal-plate workers, bricklayers, carpenters, decorators, carvers, masons, and others.

The classes re-open next week, and it is hoped that there will be a considerable increase in the numbers of workmen and apprentice students. As regards the latter, they are admitted at a nominal fee of 2s.

FATAL FALL OF A CORNICE COVE.

THE coroner at Sheffield has been investigating the circumstances attending the death of a labourer named Moclar, aged 30, who was killed at the new Midland Bank in course of erection in Sheffield. The building is being put up from the designs of Mr. Swann, architect, and the contractors are Messrs. Chambers. The style of architecture is Corinthian, with massive cornice and parapet. On the morning of the 20th ult., as the "closing" stone of the cornice on one side of the building was being lifted into its place, all the stones except one toppled over into the street, as we have already mentioned, killing the deceased and injuring two other men.

The question whether the architect or the builders, or neither, were to blame for the accident was fought out at great length before the coroner.

Mr. John Chambers, builder and contractor, in partnership with his brother, said they were the contractors for the bank under Mr. H. L. Swann, the architect. During the last six weeks Mr. Swann had been upon the premises almost daily, to see that the work was carried out according to the plan, details, and specifications, and they had been strictly carried out with regard to the cornice. It had never struck him that there was anything unsafe in the cornicing. If the stone had been "weighted," it would not have gone over; but he considered that Marshall, the foreman, who had the setting of it, did the work properly. The reason the stone fell was clearly due to the fact that the end which hung over was heavier than the other end. The dental cornice-stone should have been broader in the bed, in his opinion, but he had to work according to specification.

James Marshall, foreman mason, 202, South-street, Park, said he had charge of the work of "setting" the cornice. In his opinion the cause of the accident was the cornice not having bed enough.

Mr. J. B. Mitchell-Withers, architect, who had been instructed by the Coroner to make an inspection of the building, for the purpose of ascertaining the cause of the accident, presented a report giving the result of his inspection. Mr. Withers gave it as his opinion that the cause of the accident was an error of construction on the part of the architect, which error was that the cornice had not sufficient bed behind it. The architect, Mr. Mitchell-Withers said, had been rather too economical in the use of stone.

Mr. Swann and his witnesses gave evidence to the effect that ample tail-weight was allowed to the cornice, and that when the parapet was on it would be weighted by about fifty tons. If props or sets were required to keep the cornice in its place until the parapet was put on, it was for the builders to have provided them.

The jury, in their verdict, censured the architect for not having allowed sufficient tail-weight to the cornice, and blamed the builders for not having called the architect's attention to it; but, inasmuch as neither was criminally culpable, they found that the man's death had resulted from an accident.

Books.

Eastern Cities and Italian Towns, with Notes on their Architecture. By R. POPPLEWELL PULLAN, F.R.I.B.A. London: E. Stanford. 1879.

THIS is a convenient-sized volume, intended to give to travellers some information in regard to the architecture of the towns named, in a briefer and more concentrated manner than in works written specially for students of architecture. The descriptions have the merit of being interesting and readable in style, while at the same time giving trustworthy information from one who has been over all the ground himself and writes from observation at first hand. A considerable portion of the book appeared originally in our own pages.

Handbook to the Cathedrals of England. St Paul's. With illustrations. London: John Murray. 1879.

MR. MURRAY'S Handbooks of Cathedrals are, as every one knows, very different things from the imperfect *brochures* which used to satisfy the general idea of a handbook. This is a work of over 200 pages, containing a synopsis of the history of the old cathedral, the building of the present one, an account of the monuments and some particulars of the deeds of those whom they commemorate, and also a special history of the see, with brief lives of the bishops and of a few of the more eminent deans. The illustrations, though not of the highest class (which could hardly be expected in a work of this kind), are sufficient to give a good idea of the various parts of the building; those representing detached portions of the interior are better than the general views. In describing the Wellington Monument it ought to have been mentioned that the monument is not now complete as Stevens designed it, and that an equestrian statue was to have occupied the upper platform, which now makes such an awkward finish, from no fault of the sculptor who designed it. It is satisfactory to see a handbook which is not occupied with indiscriminate laudation of everything; the monuments, for instance, are described on account of their historic interest, but with the observation that their artistic value is in most cases small. Special description of some of the experiments that have been made or proposed in the way of decorating the interior (without any critical expression of opinion) might, we should say, have been a useful and desirable addition to the handbook. The compiler has not forgotten this part of the subject, but states in a footnote that he purposely abstains from giving any detailed description of proposed experimental improvements. But a general statement of the principal schemes that had been proposed would enable the more intelligent class of visitors (who alone will use such a handbook as this) to form some definite idea, in comparing the book with the building *in situ*, of what has been proposed and of what its effect might be; a point in regard to which the majority even of intelligent visitors have at present but very vague ideas.

Deaths in Child-bed, and our Lying-in Hospitals. By ÆNEAS MUNRO, M.D. London: Smith, Elder, & Co. 1879.

WE were considering the subject of hospitals recently, and here is a small book containing practical suggestions in regard to a special and very important class of hospital, in which London seems, from Dr. Munro's account, to be badly off in regard to extent of accommodation; while of existing hospitals of this class in various parts of the kingdom, some, at least, would seem to be deficient in some of the first requirements of humanity and civilisation. In one portion of the book Miss Nightingale's recommendations in regard to hospitals of this kind are printed, with marginal observations by the author. In regard to Miss Nightingale's observation that no woman in her trouble should see another operation going on at the same time, this is our doctor's comment:—

"Not only should she not see, but she should not hear, and this, we think of greater importance even, because it is less considered,' and therefore more apt to escape notice. This seems to us such a humane thing that we cannot help expressing our amazement at the continuance of the present practice in the Dublin Rotunda Hospital. There, there may be one or two women in labour, with three or four other women lying in the other beds of the ward with their children" (!)

Probably many readers will share our astonishment, we might say indignation, at the existence and toleration of such a barbarous state of things in any hospital of the present day. One of the objects of Dr. Munro's book is to suggest an improved cottage plan for lying-in hospitals, providing a separate room for each case. The only alternative to this which ought to be allowed is the setting apart of one room to which patients can be moved shortly before the critical moment arrives: an arrangement, however, which is open to the objection that it necessitates the removal of the patient at a time when movement may be unsafe. Plans and elevations of Dr. Munro's single-room hospital are given, and we presume it is mainly on this account that we have been favoured with a copy of the work, the greater part of which is addressed to medical men. As far as we can judge, apart from special medical advice, the plan seems to meet the case very well; the single-bed wards being grouped in fours, two on the ground-floor and two on the first-floor, with a nurse's room adjoining. The basement is given up to stores, nurses' rooms, and patients in an early stage ("expectant patients"). We must object, however, that the w.c.s, both in basement and upper stories, are not well placed, and some modification of this part of the plan, by an experienced hand, could probably be made to realise an improvement with little, if any, addition in cost over the plan as now proposed. The elevation of the cottages might be made both more attractive and more suitable, not merely without additional expense, but even with less. As shown, they look like a row of third-rate builder's villas. These are matters of detail, however, and the general merit of Dr. Munro's scheme is only partially affected by them.

In speaking of hospital floors the other day, in our review of an American work on hospitals, we mentioned the general recommendation in that work (as well as elsewhere) of very hard wood in narrow lengths for hospital floors, and observed that as the object was to prevent the retention of any infectious matter, a cement floor would answer the purpose still better: we supposed there might be some medical objection to it, from its not being suggested. We observe, however, that Dr. Munro makes precisely the

same suggestion; he thinks that "cement covering concrete suits better than anything else at present known."

Letts's Diaries and Office Helps.

CERTAINLY a remarkable variety! Of Letts's Diary, which was originated seventy years ago, the publishers now issue, we learn, 156 varieties; small size and long size, bound and unbound, special diaries for various professions, diaries loose and diaries that lock, are amongst them, and, in fact, we may say that those who want anything of the kind have only to ask their bookseller to show them the list of Letts's publications, and they will find what they want. Saxby's "Weather Almanack" last year, issued by the same firm, passed through three editions, the peculiar weather of the year being forecast with remarkable accuracy.

Miscellanea.

Price of Land in Liverpool.—A few days ago the *Liverpool Daily Post* reported the public sale, by Messrs. Branch & Leete, on behalf of Lord Derby, of a quantity of land in the heart of Liverpool, and it is interesting to note the prices obtained in this time of commercial depression. The land submitted to auction is situate in Stanley-street, and the adjoining streets, running at right angles from Dale-street to Victoria-street, and immediately adjoining the Municipal Offices and new Law Courts. Since the opening out of Victoria-street this property has stood in the way of town improvements; but the several tenancies and leases having now reverted to the noble owner, he has caused the old buildings to be cleared away, and submitted the land in well-planned and convenient lots to public competition, on his lordship's usual terms of seventy-five years' lease, with a ground-rent of 4½ per cent. on three-quarters of the purchase-money. The land has been divided into thirty-two lots, but only nine were sold by auction. The following are the lots sold and prices realised:—

Lots 1 and 2, 521 yards, 24*l.* 10*s.* per yard, 12,764*l.* 10*s.*
Lot 11, 324 yards, 27*l.* per yard, 8,508*l.*
Lot 25, 200 yards, 12*l.* per yard, 2,400*l.*
Lot 26, 202 yards, 22*l.* per yard, 4,444*l.*
Lot 28, 361 yards, 21*l.* per yard, 7,581*l.*
Lot 30, 331 yards, 31*l.* per yard, 10,261*l.*
Lot 31, 329 yards, 26*l.* 10*s.* per yard, 8,718*l.* 10*s.*
Lot 32, 195 yards, 4,390*l.*
Total,—2,463 yards, 55,077*l.*

or an average of 22*l.* 14*s.* 2½*d.* per superficial yard, and over 100,000*l.* per statute acre.

The Iron Trades.—Messrs. Matheson & Grant, in their half-yearly report, say that a general activity is spreading. They add, "Those who feared that the depression of the last few years was to be perpetual have had their doubts dispelled, but foreign competition and the want of reciprocity are still the bugbears of many. But it is more than ever evident that this country, in all that concerns the manufacture of iron and steel, and in the innumerable industries dependent on these metals, has advantages for years to come over all other countries. Notwithstanding the artificial restraints of protective duties, purchasers will find their way to the cheapest market, and the restrictions and loss which hostile tariffs impose on those who frame them will far more than outweigh in international competition the injury which they inflict on us. Even at this, the commencement of better times, the causes which lead to reaction are not wanting. The depression in the last few years has been due, not so much to any great diminution in the weight or volume of English manufactures, as to the extension of factories beyond the demands upon them; and the new iron and steel works already commenced and projected are on a scale which may lead to disappointment and loss hereafter."

Proposed Wood-Carving Exhibition, Albert Hall.—This is now fully determined on, and it is to be hoped that all concerned in the progress of the art in general, whether manufacturers, designers, or executants, or those who unite all three in themselves, will assist in producing a fine collection of works. Mr. G. A. Rogers and Mr. Donaldson (of Gillow's) have agreed to assist the Council in making the matter known and collecting works for approval. Inquiries may be addressed to Mr. Wentworth Dole, at the Hall.

The Artisans' Dwellings Act.—At the meeting of the Metropolitan Board of Works on the 2nd inst., a long letter was read from Mr. Cross, the Home Secretary, in reply to a request from the Board for his approval of certain modifications in the carrying out of the Streets Improvement Acts and the Artisans and Labourers' Dwellings Act, 1875. The Board being unwilling to undertake all the responsibilities of the execution of these Acts, great delay in the projected improvements in these streets and dwellings had in consequence arisen. The Home Secretary is of opinion that it is essential that in street improvements the first step should be to provide houses for the working classes to which those who are displaced belong; the next to carry out the improvements. If, therefore, he is now to be called on to release the Board from the statutory restriction, he must require not only that the whole of the substituted sites (with such addition as may be necessary to cause them to be sufficient) should be cleared, but that the houses should be erected thereon, and be made fit for occupation, before the rest of the land is cleared for improvements; or if the Board prefer to proceed by stages, he will be willing to consider an arrangement whereby successive portions of the land may be cleared as soon in each case as houses have been erected on other sites sufficient to provide for a number equal to the number displaced.

A Large Metal "Tabernacle."—The *Birmingham Gazette* says that Messrs. Thomason & Co., of Birmingham, have just completed, for a Roman Catholic church near London, a tabernacle, which, it is claimed, is the largest ever made of metal in this country. It is circular in shape, 6 ft. in height, and 2 ft. 6 in. at the base. The mouldings at the base are enriched by beaten foliage. The "safe" portion is made of wrought iron, but is covered with gilt plates both inside and outside, the latter being decorated with ornamental bands, mouldings, and engravings. Around the centre of the tabernacle is the inscription, "Hoc est depositum corpus, de Virgine natum." The door is engraved and jewelled, and inside a vesica, upon a diaper ground, are represented the chalice and paten, surrounded by the wheat and the vine (emblems of the sacramental elements). From behind the cresting which surmounts the safe rises a large dome, and above it a smaller one; while at this point there is a wreath, or "crown of thorns," all of gilt metal. Mr. W. Millward was entrusted by Messrs. Thomason with the gilding.

A "Mud-Hopper" for Liverpool.—Messrs. William Simons & Co., of Glasgow, have just launched a new "mud-hopper" or sewage steamer for the Corporation of Liverpool. The new vessel, which is named the *Liverpool*, resembles externally an ordinary steamer. The hull and the deck are built of iron, but in the construction of the hopper cavities steel is used. The vessel has been designed to carry a dead weight of 350 tons, and her speed will be nine knots an hour. She is intended for the conveyance of the sewage and street sweepings of Liverpool, and depositing these in deep water. At present the refuse of the town is carted out of the town and part sold to any buyers, but the receipts are a far way off meeting the expenditure of cartage. The sewage steamer is somewhat after the design of the Clyde hopper barges, but instead of one hold, she has ten compartments divided by steel plates, with hinged doors at the bottom of each for discharging the cargo.

"Stickphast," or office paste, to take the place of gum, as being more clear, is certainly as effective, and its makers profess that it will not turn sour, which time alone will prove. We can safely say that the perfume (cloves) arising from the bottle we have gives promise that they are correct, and moreover will be found very pleasant in many a musty-smelling office.

The Oxford Military College, Oxon.—The governing body of this Institution have intimated their intention of giving a gratuitous education to two orphans, who must be sons of officers killed in war, or who died whilst on active service abroad.

The late Sir William Boxall.—The will, dated December 21, 1878, of Sir William Boxall, R.A., who died on the 6th ult., was proved on the 17th ult. by Mr. Philip Charles Hardwick, the acting executor, the personal estate being sworn under 12,000*l.*

Blandford.—The parish church of Blandford has been re-opened, after internal renovation and the addition of a vestry. Formerly there was in the interior a two-decker pulpit and reading-desk in front of the communion-table; the pews were of the old high straight-backed pattern; and the walls and ceiling were simply whitewashed. The old two-decker has been removed, and a handsome old pulpit of Sir Christopher Wren's, from St. Antholin's Church, London, has been placed on the north side of the chancel-apse; the whole of the high pews have been cut down to a reasonable height, and the straight backs slanted; the walls, ceiling, and pillars of the nave have been cleaned, coloured, and decorated, as well as the dome of the apse over the communion-table. The floor of the apse and the steps leading to the communion-table have been paved with Minton's tiles. The decorative work of the chancel-apse was entrusted to the late Mr. W. T. Elgar, the decoration of the nave to Messrs. Stickland & Son, and the other work to Mr. A. H. Green. The total cost of the renovation is about 600*l.* or 700*l.*

Lectures at the Architectural Museum.—The honorary secretary, Mr. Seddon, proposes to give a series of popular lectures, entitled "Caskets of Jewels," during the present season, at the Architectural Museum, in Tufton-street, near Dean's-yard, Westminster. The object of the course will be to make the museum, with its contents, better known and appreciated. The lectures will be illustrated by photographic magic-lantern slides, giving the most interesting objects in the museum and the buildings whence they have been taken. The history of architecture in its several styles and subsidiary arts will thus be traversed and explained. The lectures will be at eight p.m., in the evenings of the last Tuesday in each month, the first being on the 27th inst. Admission to the museum will be free, as usual.

Forth Bridge Contracts.—The *Sheffield Daily Telegraph* understands that the lamentable accident to the Tay bridge is not likely to interfere with the Forth Bridge scheme. By the carrying out of this vast work the trade of Sheffield will benefit to a large extent. It has already been mentioned that the steel chains will be made by Messrs. Vickers, Sons, & Co., and we now learn that Messrs. Jonas & Colver have arranged with Messrs. William Arrol & Co., the contractors for the bridge, to supply the whole of the tool steel, files, hammers, and other similar goods required in connexion with the undertaking. Some idea of the magnitude of the work is given when it is stated that the order to Messrs. Jonas & Colver amounts to considerably over 20,000*l.*

Stored Light.—The luminous paint of M. Balmain has been brought recently into prominence by Messrs. Ihloe & Horne, of 31, Aldermanbury. The paint is rendered self-luminous by mixing with it a sulphide of lime or other "phosphorescent" material, and on exposing the painted surface to daylight, the light of burning magnesium, or of an electric arc, the light waves seem to set the molecules of the salt into a vibration which lasts for several hours. The result is that, on taking the painted surface into a dark place, a pale violet light is emitted from it. The projected applications of the paint are for buoys at sea, lamps for powder-magazines, wine-cellars, compartments of iron-clads, and advertising purposes, but the uses to which it may be put are almost infinite.—*The Electrician.*

Mr. Thomas Wainwright.—The death is announced of Mr. Thomas Wainwright, architect and surveyor, in his sixty-eighth year, at his residence, Upper Parliament-street, Liverpool. The deceased gentleman served his articles as an architect and surveyor in Manchester. About forty years ago he went to Liverpool, and entered the office of the late Mr. Alderman John Stewart, and for many years took a leading part in the conduct of the business carried on by that gentleman. On Mr. Stewart's death in 1867, Mr. Wainwright succeeded to the business, which up to the time of his death he conducted in conjunction with his son.

The Manchester and Salford Plumbers and glaziers held an aggregate meeting on Wednesday last for the purpose of considering a notice from the employers to the effect that after the 1st of May next they intend to reduce the rate of wages from 8½*d.* to 7½*d.* per hour.

Mr. Edward T'Anson, the arbitrator appointed to decide in the case of Willsmer *v.* The Leyton Local Board, in which the plaintiff claimed 1,000*l.* by reason of eight houses having been pulled down because of their erection contrary to the bye-laws, has directed that judgment be entered for defendants.

St. Alban's Abbey.—It is stated that the threatened opposition to a grant of a faculty to Sir Edmund Beckett for the restoration of the west front of St. Alban's Cathedral is likely to collapse. The design has been approved by the Bishop. The rector and churchwardens and a few parishioners, who had put in an opposition, have withdrawn it. The remaining opponents are Earl Cowper and Mr. J. Evans.

TENDERS

For six semi-detached villas at Walthamstow. Mr. W. A. Longmore, architect:—

Read & Son	£6,100 0 0!
Hunt	5,016 0 0
Watson & Dennett	4,462 0 0
Larter & Son	4,390 0 0
Reed	4,310 0 0
Howard	4,085 0 0
Jackson & Todd	2,999 0 0!

For new roads and pipe sewers at Woodford:—

Pound	£1,800 0 0
Rendell	1,578 18 0
Bell	1,482 0 0
Stodhard	1,473 0 0
Mackenzie	1,432 0 0
Knight	1,427 0 0
Marriott	1,408 0 0
Wilson	1,375 3 5
Pizzey	1,333 0 0
Taylor	1,272 0 0
Keepence	1,256 0 0
Jackson	1,222 0 0
Bloomfield	1,155 0 0
Cardus (accepted)	1,020 0 0

For roads and sewers at Stamford-hill:—

Isard	£740 0 0
Jackson	735 0 0
Chamen	735 0 0
Harris	726 0 0
Pizzey	716 0 0
Back	596 0 0

For brickwork and tiling in completing Secular Hall, Humberstone Gate, Leicester. Mr. L. Sugden, architect. Quantities by the architect:—

Riddett	£823 0 0
Mason	808 9 6
Major	730 0 0
Bromage (accepted)	685 0 0
Horsepool	622 0 0

For enlargement of Nos. 66 and 67, Kensington-gardens-square. Mr. Edward Clark, architect:—

Sabey & Son	£808 18 8!
Smith	665 0 0
Mitchell	557 0 0
Adcock	540 0 0
Trayte (accepted)	498 0 0!

For alterations to the Shepherd and Shepherdess, St. Pancras, for Mr. W. T. Purkiss. Mr. Edward Clark, architect:—

Smith (lowest)	£1,385 0 0

For the construction of roads and sewers, on the Tidal Basin Estate, North Woolwich-road, Victoria Docks. Quantities supplied. Messrs. Tunley & Boyle, surveyors:—

Lyons	£2,200 0 0
Harris	1,995 0 0
Ford	1,255 0 0
Pizzey	1,200 0 0
Jackson	1,191 0 0
Bradfield (accepted)	998 0 0

[Who will explain?]

For new stables to Kenley House, Balham. Mr. A. Causton, architect. Quantities supplied:—

Carter	£1,275 0 0
McLachlan & Son	1,090 0 0
Rider	1,080 0 0

For repairs to portion of old workhouse in Princes-road, for the Lambeth Union. Mr. T. A. Wright, architect:—

Taylor	£1,863 0 0!
Castle	1,839 0 0
Nightingale	1,143 0 0
Julian	1,030 0 0
Whitly	991 0 0
Linfield	987 0 0
Phelps & Rice	955 0 0
Stonner	897 0 0
Hall	689 0 0
Mintey	595 0 0
Craske	508 10 0
McCarthy	500 0 0
Wilkins	480 0 0
Ford & Sons	475 0 0!

For a pair of semi-detached residences, Bath-road, Reading, for Dr. Lawson. Mr. George W. Webb, architect. Quantities supplied:—

Dodd	£2,039 11 2
Kingerlee	2,025 0 0
Simonds	1,919 0 0
Kemp	1,910 0 0
East	1,879 12 6
Jenkins	1,780 0 0
Margetts	1,698 10 0
Woodroffe	1,690 0 0

For stable buildings, Fann-street, Mayfair, for Mr. Jas. Innes. Mr. R. B. Marsh, architect. Quantities by Mr. T. R. Parker:—

Carr & Sons	£6,380 0 0
Greenwood & Sons	6,374 0 0
Cross & Son	6,168 0 0
Conder	6,114 0 0
Sprake & Foreman	5,988 0 0
Temple & Forster	5,764 0 0
Lawrence	5,500 0 0
Simpson & Son (accepted)	5,434 0 0

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